Robotics247

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Improve Flexibility and Agility With Mobile Robots

PEERLESS
CONTENT CREATION

CONTENTS

EDITOR'S NOTE

Among the potential benefits of mobile robot fleets is their ability to add operational agility to supply chains. They don't require fixed infrastructure like conventional conveyors, and users can add or subtract robots as needed for seasonal variations.

That said, simply changing the number of autonomous mobile robots (AMRs), automated guided vehicles (AGVs), or self-driving lift trucks in service isn't sufficient to maximize one's return on investment, industry experts told *Robotics 24/7*.

In addition to carefully evaluating existing workflows and environments, users should work closely with suppliers or integrators to customize any deployment for their needs. Also, note that the latest software can manage more than just robot fleets, and the data they collect can lead to a virtuous cycle of observation, optimization, and planning.

In this Special Focus Issue, you can learn when human workers "in the loop" are appropriate, whether robotics-as-a-service (RaaS) models can make that initial investment easier, and what you should look for in partners. Even the largest warehousing, logistics, and manufacturing companies know better than to go it alone.

Eugene Demaitre, Editorial Director
Comments? E-mail me at
edemaitre@peerlessmedia.com

EXECUTIVE CONTACTS

Group Publisher/International Sales
Tom Cooney
tcooney@peerlessmedia.com
973-214-6798

President and CEO, Peerless Media
Brian Ceraolo
bceraolo@peerlessmedia.com
508-663-1553

Editorial Director
Eugene Demaitre
edemaitre@peerlessmedia.com
508-380-5457

Associate Editor
Leonard Phillips
lphillips@peerlessmedia.com
508-663-1558

SALES

Western Regional Manager
Darrell Dal Pozzo
lddalpozzo@peerlessmedia.com
774-505-0089

Midwest/Eastern Regional Manager
Michael Worley
mworley@peerlessmedia.com
508-663-1561

CLIENT SERVICES

Director of Client Services
Mary Ann Scannell
mascannell@peerlessmedia.com
508-663-1560

Director of Marketing
Karen Bligh
kbligh@peerlessmedia.com
508-663-1550

Director Content Management
George Kokoris
gkokoris@peerlessmedia.com
508-663-1555

Director Online Technology
John Brillon
jbrillon@peerlessmedia.com

Webcast Project Manager
Steve Paul
spaul@peerlessmedia.com
617-281-7125

Production Director
Kelly Jones
kjones@peerlessmedia.com
508-663-1554

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Mobile Robots Can Optimize Materials Movement

Automation providers are becoming more savvy about finding where technology can add flexibility.

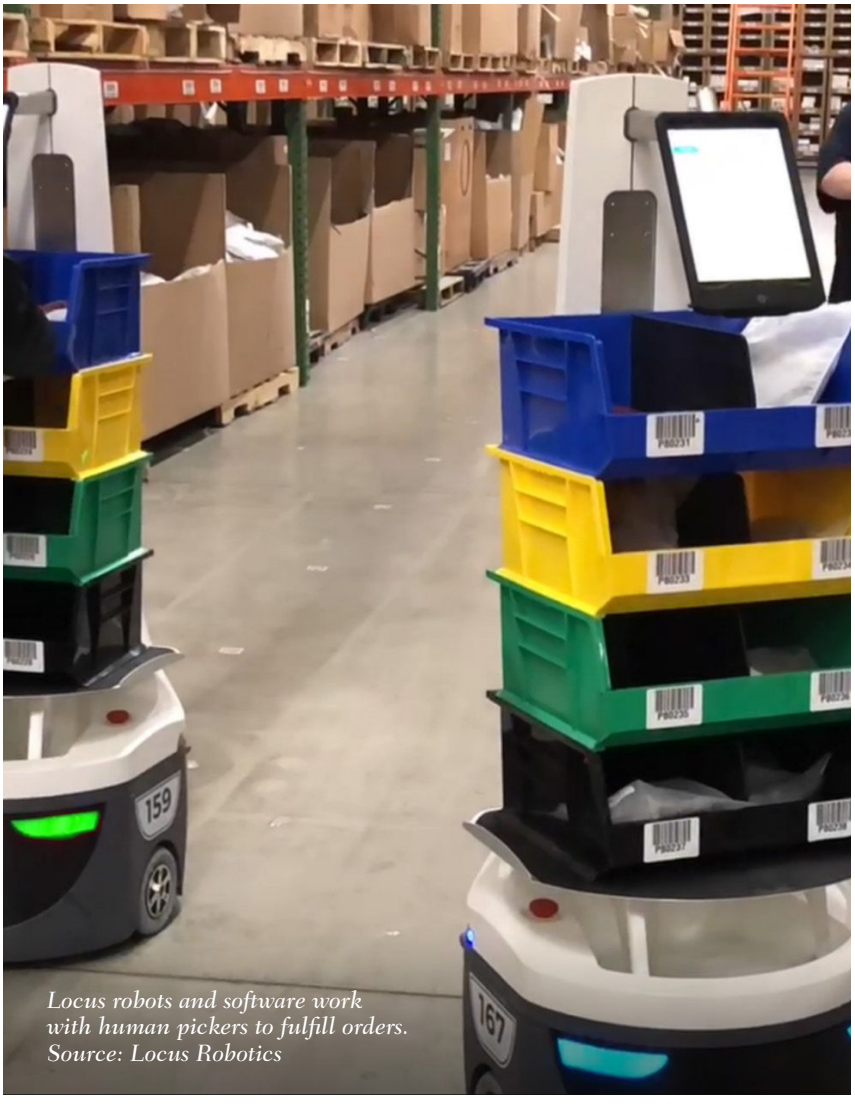
BY EUGENE DEMAITRE

One of the biggest selling points for mobile robots is that they are not fixed infrastructure like conveyor belts and can thus change routes depending on seasonal volume, shifting workflows, or new products. In addition, increasingly sophisticated software promises to pick the best robots, manual and autonomous forklifts, and human workers as agents for a particular task.

But this is easier said than done. As much as 70% of North American warehouses and distribution centers have yet to add any automation, industry experts have told *Robotics 24/7*. Even businesses that have robotics experience can run into problems growing their fleets and making sure their equipment is properly integrated and communicating. Moreover, most companies don't have Amazon's advantage of scale.

So how can automated guided vehicles (AGVs), autonomous mobile robots (AMRs), lift trucks, and fleet management software provide greater operational agility?

Note that demand is driving innovation. The global market for logistics robots could expand from $8.28 billion in 2023 to $38.13 billion by 2033 at a compound annual growth rate (CAGR) of 16.5%, according to Future Market Insights.



Locus robots and software work with human pickers to fulfill orders. Source: Locus Robotics

"The adoption of logistics robots cuts down warehouse labor expenditure and helps businesses function efficiently," it said. This does not mean that robots are taking jobs but that human resources can be reallocated to higher-value tasks.

Labor still a logistics pain point

While trade conflicts, the COVID-19 pandemic, and the e-commerce boom and not-quite bust have come and gone, employment rates remain high despite inflationary and other economic pressures.

"Labor shortages continue to

be one of the biggest challenges facing our customers in the warehousing and logistics industry," said Kait Peterson, senior director of product marketing at Locus Robotics. "That's why it's critical to optimize the existing workforce productivity while also improving worker ergonomics and overall workplace quality."

"By collaborating with human workers, our robots minimize unproductive walking time, pulling heavy carts and lifting to free up employees for more value-added work," she told *Robotics 24/7*.

While complaints about labor shortages may seem universal, location matters, noted Joe Oliaro, vice president of sales and chief real estate officer at Wagner Logistics.

"It depends," he said. "In smaller markets where the community depends on a manufacturer – whether it's Fortune 100 or local – companies are more willing to collaborate with labor because there's a finite amount."

"Large business parks or intermodal sites often trade employees back and forth for 10 to 15 cents per hour," Oliaro added. "But if you spend $1,000 to recruit an employee and are able to retain that person for at least six months, their likelihood of staying on for years goes up 80%."

Bringing in robots can help with retention, but it isn't a fix by itself, added Jane Heffner, vice president of sales at Mobile Industrial Robots (MiR).

"I've been with people in the Tier 1 automotive space, and they're seeing 150% turnover in their facilities, even after investing in onboarding and training and getting workers up to speed," she said. "AMRs can't take over everything, and while there's a tendency to pull people back with robots, it's really important to have people well trained and on site. These people can become the AMR experts."

Compounding turnover and a lack of technical skills is a generational shift, said Jim Lawton, vice president and general manager for robotics automation at Zebra Technologies.

Wagner Logistics helps customers maximize the use of their existing facilities. Source: Wagner Logistics

"Existing warehouse workers are nearing retirement age, and the workers coming in don't want those jobs," he said. "In the early days of robotics, people wanted to hear about features, but our customers don't want to buy robots or machine learning; they want to do things better, faster, and cheaper. Then you can attract labor and get it to be more productive."

Focus on flexibility

Fortunately, mobile robots are increasingly addressing business challenges. "One customer used our robots to handle peak seasonal volume surges two times their normal levels, without the need to increase staffing," said Peterson. "With volumes increasing, operators are adding mezzanines and pick towers."

"Locus' Peak Season Robots program enables customers to deploy additional robots to an existing site in just minutes to fill critical labor gaps and meet order volumes," she asserted. "The combination of fast deployment and the ability to move bots between locations provides unmatched flexibility."

Wagner Logistics found that robots freed warehouse associates to focus continuous improvement projects, one of which has saved $6.4 million over three years, said Oliaro.

"They've enabled us to learn the customer's seasonality, anticipate their needs, and give them the answers they need to make better business decisions," he said.

Experience isn't everything, but ease of use is important, said Zebra's Lawton. "Some of our best customers have experience with robotics, and some of our worst customers have experience with robotics," he quipped.

"For a long time, lean proponents weren't fans of automation, because you had to hire people to come in and change fixed auto-

Zebra's FetchCore software is designed to make controlling robots easier. Source: Zebra Technologies

mation," Lawton recalled. "The ability for robots to be adaptable, to be not only fast and easy to deploy but also to redeploy—they're designed for what facilities will need at some future time."

"We designed the FetchCore software for people who intimately understand their processes for fulfillment, sortation, and packaging," he said. "The workflow builder is designed to be drag and drop, abstracting the code away so that people without a computer science background can do amazing things."

Understand environment, processes before automating

Since real estate remains expensive, warehouse operators and third-party logistics providers (3PLs) are trying to make the most out of existing space, said Oliaro. But how much process re-engineering do brownfield sites require to take advantage of robotics?

"One customer had $16.8 million in inventory in a queue for a quality-control check," he said. "They handed it to us and said, 'Do you have a way to get through this?' We had to do a kaizen sort to reevaluate the whole process, but we ended up eliminating 95% of QC sort, freeing up 75,000 sq. ft. and reducing overhead so they could deploy employees elsewhere."

Wagner's Oliaro cited an example of improving inventory accuracy with drones from partner Gather AI. "It would normally take a person in a reach truck or a scissor lift a day to do two aisles, but the drone can capture barcodes and confirm cycle counts for six to 10 aisles a day," he said.

In addition, robotics suppliers are applying their experience from multiple projects to newer ones, said Heffner.

"It depends on the application and the facility itself," she said.

A MiR AMR demonstrates the transfer of a box to a conventional conveyor. Source: Mobile Industrial Robots

"An older facility with uneven floors and slim aisles is harder than if robots are going into a new one."

"Very few of our customers have one robot anymore, and we're insisting that they complete a product design review so we understand their environments," Heffner added. "We bring that back to our application engineering team to make recommendations about changes, incorporating our partners and technical expertise. It's not a tactical sale."

RaaS offers to reduce overhead

The robotics-as-a-service (RaaS) business model provides a degree of financial flexibility when adopting automation, but users need to understand if the term refers to a lease, a pay-per-pick arrangement, or an outsourced service.

"Our business model is exclusively RaaS-based," said Locus' Peterson. "Customers choose our model versus a capital expenditure to get started with minimal upfront investment and the ability to pay based on usage," he explained. "They can expand and get consistent support as their needs grow, and we can manage thousands of customer robots worldwide through our LocusONE AI-enabled, cloud-based platform."

"Not only can RaaS help save on upfront costs, but it also allows 3PLs' contracts for automation to line up with those of their customers," said Lawton.

By contrast, most of MiR's customers buy direct, and some use leasing services, according to Heffner. Once again, robotics users will have to find the best arrangement for themselves, but major vendors are invested in helping them succeed.

Eugene Demaitre *is editorial director of* Robotics 24/7.

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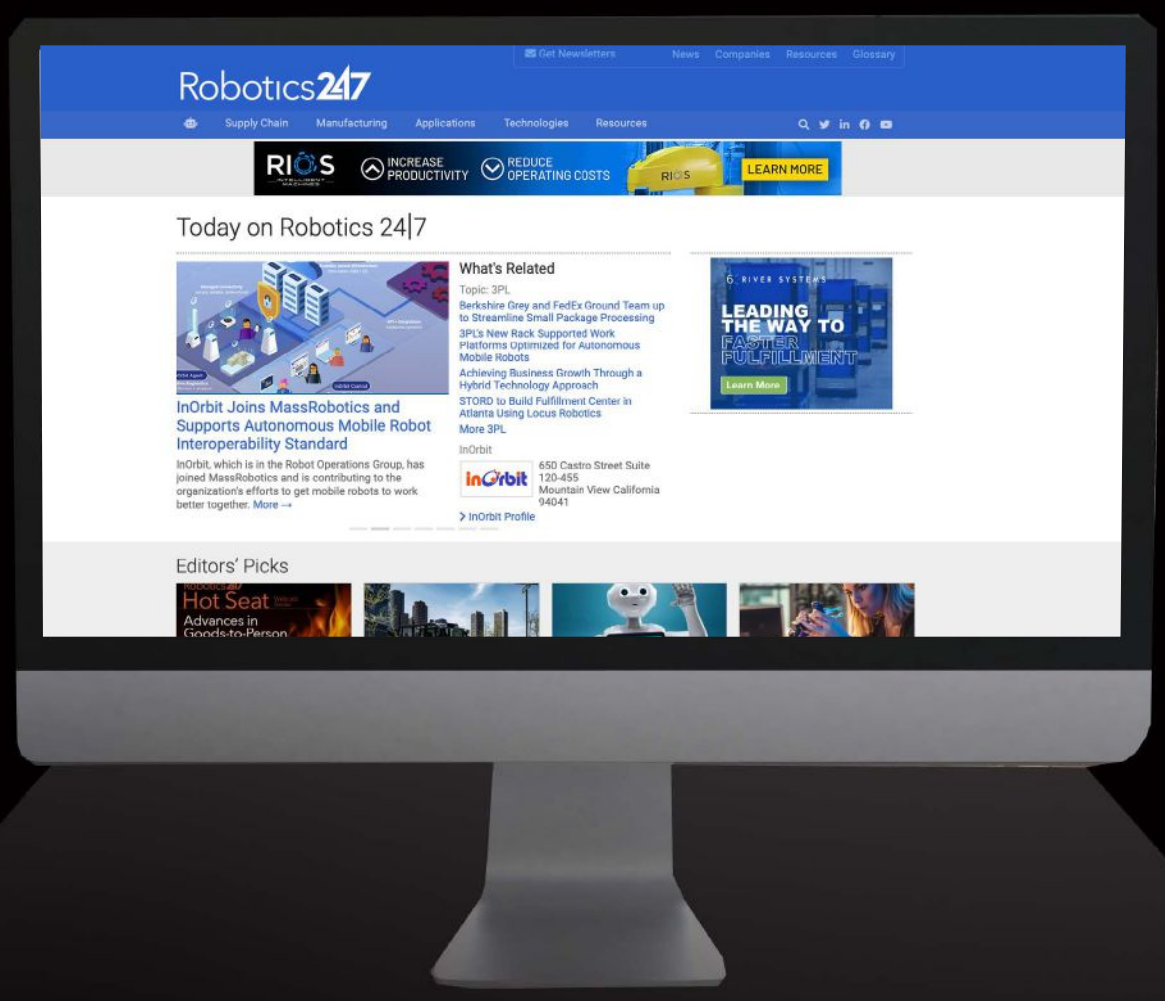

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Mobile Robot Deployments Require Data, Sizing, and Strong Relationships for Success

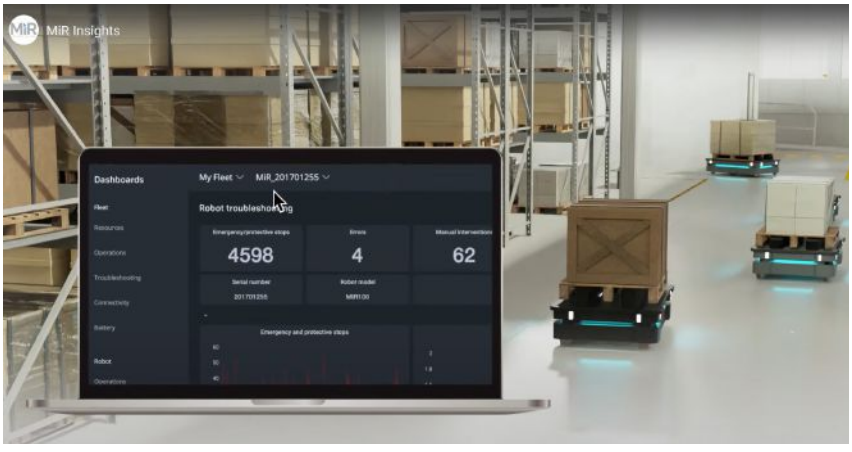
To guarantee flexible and productive implementations, operators need more than hardware or fleet managers, assert industry experts.

BY EUGENE DEMAITRE

As supply chain operations bring in or add mobile robots, they quickly learn that adding hardware is only part of the process. Integrating and updating software, analyzing data, and building productive partnerships are crucial to ensuring a return on investment, noted industry experts.

Robotics 24/7 previously examined how mobile robots can add flexibility to end-user operations. We continued our conversations with the following executives on how companies can get the most out of new or growing deployments:

- **Jane Heffner,** vice president of sales at Mobile Industrial Robots (MiR)
- **Jim Lawton,** vice president and general manager for robotics automation at Zebra Technologies
- **Joe Oliaro,** vice president of sales and chief real estate officer at Wagner Logistics
- **Kait Peterson,** senior director of product marketing at Locus Robotics



MiR Insights provides real-time data and insights into mobile robot operations. Source: Mobile Industrial Robots

Suppliers harness data for continuous improvement

How have mobile robots evolved in the past year? We've seen a mix of larger models, higher reaches, and more sophisticated software.

Peterson: Locus is continually improving our robots' hardware and software capabilities based on customer needs, use cases, and incorporating the latest technologies and innovations. This has allowed for greater payload capacities, longer battery life, and expanded integrations with warehouse software, as well as more advanced fleet management and optimization tools.

But it's not just about the robots—it's about delivering intelligent, flexible automation that makes the customer's operations more efficient, productive, and easily scalable as they grow.

In addition to fleet management, are you collecting data about throughput, warehouse conditions, and more?

Peterson: Absolutely. With the permission of our customers, we collect and share numerous data points that provide valuable insights into the customer's warehouse and fulfillment operations. This enables contin-

uous improvements in areas like inventory management, workflow optimization, and predictive analytics.

Locus turns this data into actionable intelligence, and we maintain a separate and actively monitored database for each customer.

It is used to provide forward-looking business intelligence delivered in real time to allow up-to-the-minute insights into the operation. This information can be accessed from anywhere at any time via our secure management portal.

Heffner: We or our customers can use MiR Insights to look at where robots are at any point in time. It measures productivity, missions run, the distance traveled. Users can access that data securely from anywhere.

The user doesn't have to wait to make changes to maximize productivity. Each customer's data is theirs, in the cloud and protected, we can use it generically as lessons learned for product design review process.

By bringing those improvements from fleets into the next projects and really working with and learning from strategic partners and customers, MiR Insights has been extremely useful in optimizing systems rather than just reacting to problems.

Kait Peterson, Locus Robotics

The roles of AI and human-machine collaboration

Beyond autonomous navigation, what role does artificial intelligence play in managing robot fleets? Do you see a place for generative AI?

Heffner: Now that we have pretty large install base, MiR Insights allows us to use AI to look at that data and help customers optimize their systems. We can ask, "What would a new environment look like?"

Peterson: Our robots have been using AI from the very beginning to evolve tasks like dynamic path planning and object avoidance.

Our cloud-based LocusONE platform applies AI to optimize fleet management, workflows, and collaboration with human workers. It also provides valuable and intuitive business intelligence through real-time dashboards and insightful reporting tools.

We are actively integrating the next generation of AI across our software and hardware to continue to help to improve productivity, efficiency, and fulfillment speed. We're excited about the future possibilities.

How important is human-machine interaction (HMI) to your customers?

Oliaro: We've outsourced to Gather AI to do this for us. It's a model of having the partner train us to get to the point where the warehouse inventory specialist can handle automated cycle counting.

Joe Oliaro, Wagner Logistics

Training is no different than wat we were doing before. The process of scanning labels is the same, and we're training eveyrone in how to operate, maintain, and troubleshoot these systems.

Wagner also has AGVs from Dematic that we handle as a 3PL [third-party logistics provider] ourselves.

Peterson: Human-machine collaboration is core to our approach and value proposition. Our robots are designed to enhance a worker's productivity and improve ergonomics and workplace safety.

Locus bots seamlessly work alongside human teammates; they do not replace them. With less walking, lifting, or pulling heavy carts, people can focus on what they do best – picking and putaway.

Customers have repeatedly shared feedback on how our collaborative robots do more than improve productivity; they dramatically improve the work environment, which leads to higher worker satisfaction and increased retention.

Heffner: HMI is really critical to successful AMR [autonomous mobile robot] deployment.

Employees who work around the robots have to be aware of safety and how to keep them running, since they're designed for dynamic environments.

At Automate, I noticed that MiR's booth was one of the few you could walk through where robots were interacting with people. We've spent a lot of time designing and looking at that interface for safety.

What does that mean for robots on a mission? Are there markers for different zones? It's also a matter of picking the right colors and explaining how to do things like clean the robot.

Jane Heffner, MiR

We've also introduced fleet management in MiR Insights, which can maximize the use of that data.

Partnerships and markets

Where do you see a greater focus on adding automation—among 3PLs or small and midsize enterprises (SMEs)—and why?

Peterson: We see demand for automation growing significantly across 3PLs and SMEs. 3PLs use robotics to meet customer demands for faster fulfillment at lower cost.

For SMEs, adopting flexible automation can help them differentiate themselves from competitors operationally and keep pace with larger players. Our partnership-first approach allows us to deliver consistent value to customers of all sizes and across multiple industries.

Lawton: Most of Zebra's activity has been on the 3PL side. The value proposition is super clear, and there have been enough proof points in the market.

"If we invest in that tech, we can drive those kinds of results," say [prospective] customers as they check boxes. They want to see that companies like theirs are getting value.

People know that the bump from automation is big enough that they have to do it now. When Zebra did an RFP [request for proposals] for its own 3PL work, all the proposals included automation.

That's also where robotics as a service [RaaS] comes into play. Not only does it save on upfront costs, but it also allows 3PLs' contracts for automation to line up with those of their customers. RaaS can help shorten time to value.

Heffner: It's not a specific market. We really see demand across the board—anywhere materials need to be moved from Point A to Point B. As we've seen with the Rockwell Automation acquisition of OTTO Motors, the need for short-distance transportation is enormous.

Materials handling can be done in hospitals, industrial spaces, and 3PLs. Its more about the robotics application itself than a specific market.

With labor shortages, reshoring is hitting a wall. If companies can't find people, we're able to offer continuing initiatives to help.

Another place we're seeing activity is around the Inflation Reduction Act and the CHIPS Act. If we follow the money for infrastructure, battery technology, electric vehicles, and renewables, it's helping to make existing plants larger or to new greenfield facilities, particularly in the Southeast.

This is an ideal opportunity to incorporate AMRs into your operations.

What should companies new to robotics look for in their providers/partners?

Peterson: It's critical to look for providers with deep experience in deploying and supporting robotics automation in real-world environments. Companies should look for responsive post-deployment support, robust software and analytics, and a collaborative approach to integration.

Locus starts with an in-depth analysis of the existing site, its current metrics, workflows, etc. to establish performance benchmarks and goals. With over 280 sites deployed worldwide, Locus [knows] what it takes to deploy, support, and scale AMRs.

We work closely with the customer, from planning to deployment and beyond, providing AI-driven business intelligence that enables efficient operation and seamless scalability.

Heffner: As adoption increases, customers want experience and

a willingness to work with them and understand their applications.

People have moved on from wanting to try out one robot. Now, they want to start with 25 in a facility, and the ability to help them do that is critical.

MiR has lessons learned from deploying fleets. While a robot may be simple to use, bringing multiples into a facility can be complex. We have an experienced applications team that can scope a project and look at the environment, as well as what's happening with AMRs and comparing them with other places.

Lawton: I want a relationship with a competent organization that I know is in alignment with our long-term, strategic vision. Early users of these technologies know it isn't the endgame; it's just one step toward automation providing value.

Jim Lawton, Zebra Technologies

We spend a lot time with our customers asking, "Where you see things going, and how can Zebra's technologies help?" Return on investment [ROI] obviously has to be there, but we don't want to talk about payback until we're good with the alignment.

The reality is that there are going to be problems. For example, hooking up with a warehouse management system [WMS] can be difficult.

Customers also have to trust that robots will operate around people in a way that's productive and safe. Some employees will receive automation as helpful and will want robots to do the things they don't like.

On the other hand, a few companies have had to insert cameras in their facilities because of sabotage. It's all about building a trusting relationship.

Integration and ROI

What's the biggest challenge for mobile robot users to get ROI? How can suppliers and integrators help?

Peterson: It's important to understand exactly where and how adding automation to their operations will have the biggest impact. Our application engineers collaborate closely with customers during planning and deployment to ensure we're targeting the right areas and fully understanding their workflows.

We establish baseline metrics using the customer's data to enable measurable improvement goals. Close support during ramp-up and easy-to-understand training helps workers hit the ground running, often generating 2X productivity increases right from Day 1.

Oliaro: We're looking for repetitive moves and long travel that can be automated. That doesn't necessarily eliminate jobs, but it creates opportunities for better warehouse productivity and efficiency and redeploying assets to areas we couldn't do before.

For example, in meatpacking, like in a warehouse, there are lots of repetitive motions. We ask employees how we can get to a better working experience.

Heffner: My experience is that the majority of companies have very defined criteria—typically headcount reduction—but so many other things can go into that. They don't have to train each new robot, unlike onboarding costs for humans.

There are intangibles about the nature of work that are hard for the financial suite to wrap its head around because they can't be quantified. Vendors and distributors need to be able to work with different stakeholders – maintenance, engineering, finance, purchasing, the CEO – and be able to not explain the value proposition, but also demonstrate how it will help. We're training our sales team to do that.

Even when we're working with integrators, we still want to bring our experience and that from other integrators to help them grow and serve the customers. Channel partners are key, but they have to be an extension of our approach.

We're demanding in the U.S. that a product design review be completed for any new application. As we evolve the tools, we're continuing to apply our experience to ongoing relationships and continuous improvement for ROI. •

Eugene Demaitre *is editorial director of* Robotics 24/7.

Trimble Provides Advanced Path Planning, Data Collection to Enable Agile Response

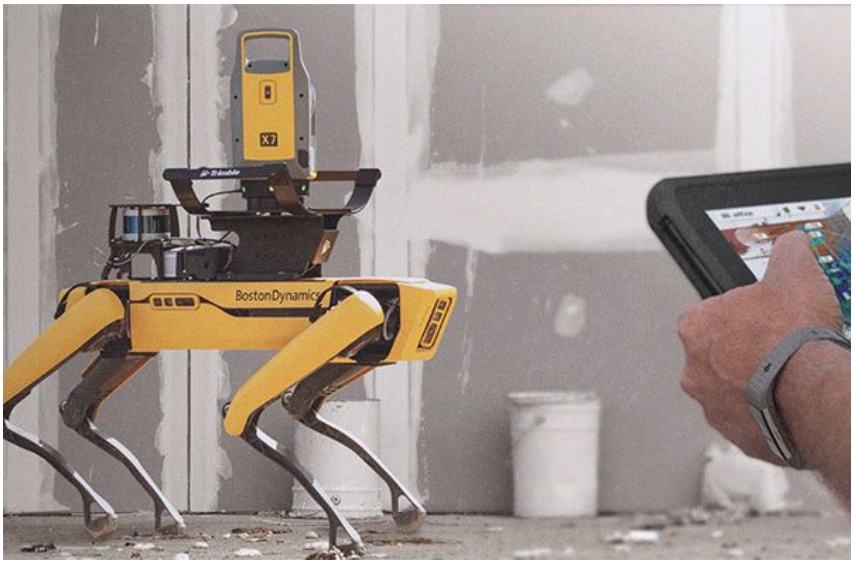
From field robotics to warehouses, the ability to collect data and more precisely maneuver offers business benefits.

BY EUGENE DEMAITRE

Mobile robots, data, and artificial intelligence promise to make automation easier than ever for warehouses to adopt. But we're not yet at automation nirvana, and operators should still carefully evaluate their own processes, vendors, and integrators before proceeding. Trimble Autonomy offers positioning, modeling, connectivity and data analytics technologies linking hardware and software.

The Westminster, Colo.-based company said it can add capabilities for automotive, construction, and agricultural applications, among others. Robots and autonomous systems that can generate their own high-definition maps in real time can not only more easily navigate complex environments, but they can also help optimize fleets and provide users valuable insights, it said.

Gordon Hain, product manager at Trimble Autonomy, replied to *Robotics 24/7*'s questions about robotics and operational flexibility.



Trimble's X7 3D laser scanner and FieldLink software are integrated with Boston Dynamics Spot quadruped for autonomy on construction sites. Source: Trimble

Customers seek efficiency, visibility

Are your customers looking for flexibility, to augment scarce workers, or something else right now?

Gordon Hain, Trimble

Hain: The key factors that we are seeing in the market are a drive to greater levels of safety, efficiency improvements, and in some markets a drive to improved sustainability. There is also the concern of a lack of skilled operators, as the senior workforce is nearing retirement, and there is a limited number of replacements.

Another area where we see some need is the ability for longer working hours to add value. Autonomous machines offer the ability to work

24/7 or during evening hours, when there is no sun or when the ambient heat is lower.

In the "bid-to-build" process, how is autonomy plus data collection and analysis providing greater visibility at a manageable cost? Do construction business owners know what they're looking for, or do they need guidance with new types (and timeliness) of data now available?

Hain: I don't think conceptually that there is anything autonomy is going to give owners or operators, in terms of field data, that we can't get other ways.

Owners know what data they need to effectively run their operations. However, what we are going to be able to do is get a greater level of visibility as it relates to a specific machine and task. With data gathered from autonomous machines we are going to be able to tell you exactly:

- How long we took to do a task
- How many times we stopped
- The quality of the work performed
- The cost of the task
- Accurate asset utilization

With this data, we can create an end-to-end digital workflow, from estimation and scheduling to execution. This provides traceability that facilitates informed decision-making, resulting in streamline operations, enhanced visibility, and ultimately greater profitability.

Trimble offers path planning across applications

With advanced path planning, are we talking about autonomous mobile robots (AMRs), automated lift trucks, or other equipment?

Hain: Trimble's advanced path planning isn't limited to a particular vehicle type or application. The Path Planning service was developed primarily for our main market segments, agriculture and construction, but is not limited to those markets.

One of the advantages of the system is that it can accommodate a wide range of vehicle types such as front wheel-steered, four wheel-steered, articulated, or differential steered. It also takes inputs for attached implements—for example attachment type and implement dimensions—to incorporate into the planning algorithms.

When it comes to the application that you are planning for, commonly, we are looking at some form of coverage plan, whether that be for seeding, harvesting, compacting an area, etc. The Path Planning Service [PPS] determines the most efficient path for the vehicle to follow, given the attached implement, execution parameters, and field layout to complete the task.

How has this improved in recent years, and how does it lead to continuous improvement?

Hain: The PPS has evolved over the years, incorporating new steering models, adding new implement attachment types and implements, managing complex field designs and many other features.

How much training and adjustment time do operators need to adopt hands-free steering control? How does your company handle the handoff between autonomy and manual control?

Hain: Operator acceptance is typically quite fast. Many of the operators have prior experience with our operate guidance solutions, so the graduation to hands-free operation isn't a big jump.

After operators have gained understanding of the new functionality, determined how to seamlessly integrate it into their in-cab workflow, and subsequently had the opportunity to test the new capability, acceptance follows quickly.

While exceptions may arise, considering the human element, a subset of operators may exhibit a degree of hesitancy or skepticism. This requires an additional measure of patience, but ultimately results in successful adoption.

When developed with the end user in mind and delivered by Trimble's expert dealer channel personnel, operator-assist technologies are generally met with enthusiasm.

Can you give an example of how field data capture enables projects to be delivered faster?

Hain: While I don't have a particular example to share here, field data from autonomous vehicles will enable better utilization of assets leading to more efficient operations and cost reduction. The end-to-end digital workflow is the traceability from estimation and scheduling, being able to control when a particular task is to be completed and by which piece of equipment, to execution of the task.

Being able to tie field data from the autonomous machine back into the estimation and scheduling will provide stakeholders with accurate real-time information to make the necessary adjustments. This will provide a fast and agile response mechanism that prevents potential bottlenecks and enables swift decision-making, ultimately accelerating the project timeline.

AGCO enters joint venture for agricultural tech

Recently, leading agricultural machinery provider AGCO Corp. announced that it had entered into a joint venture with Trimble in which it will acquire an 85% interest in Trimble's agriculture portfolio and technologies for $20 billion in cash and the contribution of JCA Technologies. The company said the joint venture will create a mixed-fleet precision agriculture platform supporting the future development and distribution of Trimble Ag technologies.

"This deal significantly enhances AGCO's technology stack with disruptive technologies that cover every aspect of the crop cycle, which ultimately helps us better serve farmers no matter what brand they use," said Eric Hansotia, chairman, president, and CEO of AGCO.

"The exclusive access to Trimble Ag products, combined with AGCO's existing precision ag offerings, also accelerates AGCO's growth ambitions around autonomy, precision spraying, connected farming, data management and sustainability," he said. "All of these touchpoints will result in us being even more farmer-focused." •

Eugene Demaitre *is editorial director of* Robotics 24/7.

Mobile Robots Are Helping to Elevate the E-Commerce Economy

Interest in mobile robots continues to grow in educational, industrial, and retail settings as payloads increase, sensors improve, and software becomes more refined.

BY JIM ROMEO

The TORU robot has a payload capacity of 40 kg (88 lb.). Source: Magazino

Schuurman Schoenen is a Dutch shoe company, offering a wide variety of shoes. In its warehouse in Neede, Netherlands, TORU, a picking robot developed by the robotics firm Magazino, uses a 3D camera and a variety of sensors, to work autonomously every day, all day.

The robot can be programmed for inbound, as well as outbound warehouse traffic and logistics. It's an ideal solution that helps meet orders during peak seasons and keep the flow of order fulfillment moving, day and night.

Using vacuum grippers, the robot grabs hold of individual shoe boxes from shelves, sorts them correctly, and concurrently replaces the void that it created with more inventory.

Bearing the burden of warehouse workers

Picking robots, as well as collaborative robots, not only help make fulfillment centers more efficient, but they also take the load off warehouse workers so they may attend to more important tasks and overarching objectives.

Workers are less burdened with mundane tasks that can now be performed by fetch robots. Employees can keep tabs on the autonomous mobile robots (AMRs) and event vector their movement. When orders come in, the AMRs travel the distance and greatly expedite the flow of the order from requisition to shipment.

Many organizations are embracing AMRs as the robots and software that runs them are getting better each year. They're faster, carry heavier payloads than humans can, and are increasingly working with humans and other equipment to build smart warehouses and distribution centers.

Payloads can be crucial, and AMRs that can handle larger payloads can be game changers for logistics operations that don't only deal with lightweight goods.

For example, ROEQ's TMS-C500 cart can transport payloads weighing up to 1,100 lb. while still being maneuverable. The cart is designed to be super safe, with easy cutouts and emergency stops built in.

But such heavy payload AMRs also boost safety for personnel. Personnel don't have to be the ones who risk injury from heavy carting and loading. Instead, they can watch the AMR take the load and guide it about. Plus, if there's any catastrophe or collision, it's the machine that's at risk and not the worker.

AMRs come of age

The AMR market is hot, according to Grandview Research. It reported the market is expected to reach USD 10.66 billion by 2030 and grow by 16.8% over the next eight years.

There's not much reason to doubt such a forecast. E-commerce has accelerated supply chain services from transportation services to warehouse and distribution needs. On top of it all, add the "Amazon effect." Households around the world have come to expect everything to be delivered to their door with a few mouse clicks.

To support all this and compete reasonably in such a go-go world, new innovations and technologies are quickly being embraced. AMRs are such an innovation that help build efficiency and can pay for themselves in due time — especially for a busy facility or other logistics landscape that can make great strides when properly programmed AMRs come into their facility.

Retail also stands to benefit from AMRs

It's not just logistic centers that will capitalize on AMRs. It's also retail. The retail industry has been walloped by a labor shortage. Positions are harder and harder to fill in stores, but also in fast-food joints, restaurants, and grocery stores. Add an AMR into the mix, and such establishments may stay afloat, keep pace, and keep the fire going with fewer employees.

In the article "Tech-enabled grocery stores: Lower costs, better experience," writers from McKinsey & Company described the scenario well, citing exam-

ples of how AMRs are at the cusp of being a true value-add to the labor component of running a grocery chain store.

"Grocers have been dabbling in robotics to manage these activities for the past several years, but two recent developments have changed the game. First, technology has evolved to allow robots to start to double-hat (that is, the same robot can manage stockout checks and cleaning), which strengthens the business cases for automation and makes investments more palatable," the writers explained.

"Second, retailers no longer have the labor resources to be able to cover all activities, so they must rely on automation to complete tasks. The use of robotics for tasks that are especially difficult or labor intensive, such as price tag validation, can support sales by improving in-stock rates and pricing and monitoring planogram compliance," they wrote.

In one pilot, robots detected 14 times the addressable out-of-stock situations compared with manual scans, reducing out-of-stock facings by 20% to 30%," said McKinsey & Co.

Applied research for AMRs will create better applications

Universities around the world are busy performing research with grant money that allows them to expand the capability of AMRs.

For example, Rochester Institute of Technology researchers are developing an intelligent materials handling system for warehouses that integrates smart technologies such as lidar sensors and artificial intelligence, to refine the mobility and accuracy of AMRs in the warehouse.

In an article on its website, Michael Kuhl, professor of industrial and systems engineering in RIT's Kate Gleason College of Engineering stated the obvious: "This is one area where robotics and autonomous material handling can help. Robots can work for longer periods of time—not necessarily to replace jobs, but on some of the manual, non-value-added tasks. It means a change of focus of jobs, with people needed to design and maintain fleets of vehicles and robots."

Kuhl and his project team received a grant for "Effective and efficient driving for material handling." It is a $300,000 project sponsored by The Raymond Corporation and continues earlier work with the company by advancing previous work that established task selection and path planning of individual AMRs.

Less complex ways to automate critical workflows

In the future, there will be many hurdles to cross as the organizational cultures and their workers find ways to make AMRs useful and valuable. We can expect that they will be more collaborative with humans, but also used in conjunction with other devices, such as tablets and scanners, and other technology now found in facilities and environments that are prime candidates that stand to benefit from AMRs.

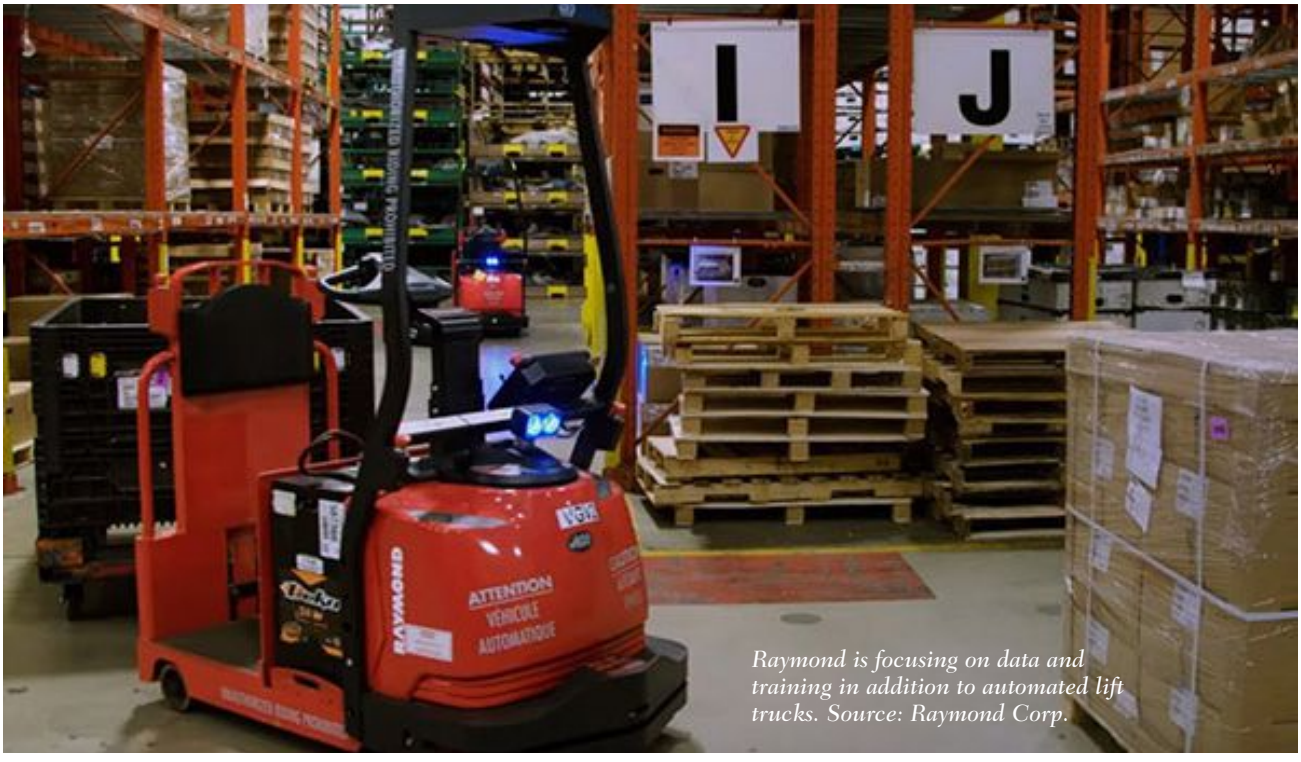
Robots continue to be a flexible solution that helps companies grow and thrive in increasingly competitive markets. •

Jim Romeo is a freelance writer and contributor to Robotics 24/7 *based in Chesapeake, Va.*

Raymond Gives Warehouse Performance a Lift With Robots and Data

From autonomous guided vehicles and telematics to training, Raymond offers 'end-to-endless' process improvement.

BY EUGENE DEMAITRE



Raymond is focusing on data and training in addition to automated lift trucks. Source: Raymond Corp.

Mobile robots and automated lift trucks are increasingly common, but companies also need reliable support and actionable data insights, according to The Raymond Corp. At recent trade shows, the Toyota Industries Company demonstrated how its technologies fit into customer processes.

Raymond provides hardware and software for intralogistics operations. The Greene, N.Y.-based company's high-capacity 5600 Orderpicker this week received a gold award in the actuators, motors, and drives category in Plant Engineering's 2023 "Product of the Year" program.

Robotics 24/7 spoke with Martin Buena-Franco, product marketing manager of automation at Raymond, about the company's lift trucks, telematics, and service strategy.

Areas of customer interest

This past spring, there were plenty of trade shows—what products received the most interest?

Martin Buena-Franco, Raymond Corp.

Buena-Franco: A big portion of our space at ProMat 2023 was AGVs [automated guided vehicles], which we're very excited about. We've had a pallet truck for some time, but it's enhanced. It's now faster and able to do staging, which is somthing our customers have been asking for.

We're also adding fully automatic autocharging capability to our whole AGV fleet. At Automate in Detroit, we showed our "total systems approach" with local reseller and integration partners. The ability to quickly and easily deliver solutions without disrupting what the customer is doing is an art and a skill.

Our idea of an "end-to-endless solution" is not just a single technology, but a full logistics solution. Materials handling is part of identity, including trucks and automation knowhow, plus lean techniques to optimize facilities.

What else have you been hearing from Raymond's customers?

Buena-Franco: Another theme has been around our robust solution for interconnecting telematics with labor management systems and warehouse management systems [WMS].

The analytics provide visibility into workdays, down to the operator level, such as if a picker is meeting a daily quota. It's a tool for productivity models and for warehouse managers and operations assistants who now have the information to make decisions on the fly.

It provides the agility to decide whether to put robots in this area or that area. Customers are finding more use cases and are connecting it to product flows and performance data. They can get very granular data about what our trucks are doing.

Several customers have told us that before they ask about automation, they want to know if it's a Raymond truck. They already know that our products are reliable, which makes it easier for new automated versions.

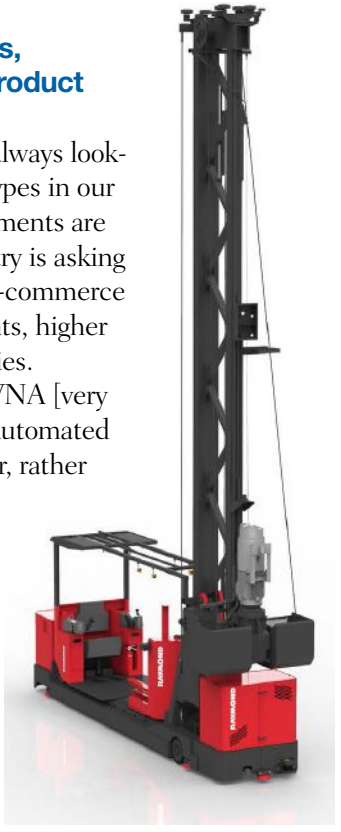
Customers are a bit more cautious with spending this year, but they're very interested in products that fit into their wider processes.

Speaking of use cases, do customers drive product development?

Buena-Franco: We're always looking at different product types in our roadmap. Some enhancements are driven by what the industry is asking for. Customer trends in e-commerce include higher SKU counts, higher bays, and smaller quantities.

Why are there more VNA [very narrow aisle] solutions? Automated VNA trucks can go higher, rather than forcing companies to expand their facilities.

We do formal studies of where the market is going, and we have customers that help us. There are several use cases that they proposed and investigated.



Raymond Automated Transtacker for very narrow aisles. Source: Raymond

Even before introducing automation, our account manager first walks around a customer's facility to learn about its pain points and identify KPIs [key performance indicators]. It's not just about the trucks; there are also training, workflow, and data components.

There's so much going on with AGVs and AMRs [autonomous mobile robots] and new developments in perception. Some use cases, like packing, are easier for us to develop. There's a lot of velocity in development on that front.

Telematics data to aid managers

How is warehouse telematics a differentiator for Raymond?

Buena-Franco: Sometimes with implementing automation, it's easier for customers to start with telematics and make some adjustments. It's a backbone that provides connectivity among all smart nodes—the trucks and software are all connected. It's all about waste mitigation, and we follow a disciplined road map.

When telematics are connected with a labor management system, now you can enforce policies to make sure that OSHA guidelines are being followed, such as a driver walking around a truck to make sure its wheels are in good shape.

Our system can collect infrastructure data. We found at a customer site cracks in the floor after investigating a shock and vibration report suggesting that a driver was dropping pallets. Telematics is about risk mitigation and training operators.

Another aspect is visualization at a higher level, to equipment and facility utilization. We describe it as a financial solution, since it includes the number of trucks for purchasing, leasing, or renting. Users can come up with a customized format.

What are more examples of how this data can be used?

Buena-Franco: For instance, based on cyclicality, we can do dynamic positioning. If you expect certain SKUs or parts to move faster, they can be placed where it's easiest for the pickers. If we have pallets, they can be placed low versus high up in back of storage, or we can put them lower on the rack if we know the weight of the finished goods. Dynamic slotting is important for seasonality.

Because trucks are reporting their status, we know their location within the facility, so we can set up zones. These zones throughout the warehouse could include slow-speed zones for congested areas near offices or break areas.

Keep-out zones could be for a pick or pack line with people, and you want to ensure that no fork truck gets in there. No-lift zones would avoid infrastructure damage; maybe we're driving underneath a suspended conveyor, a water or steam line, or an air handler. All these systems add redundance to mitigate risk in the operation of your facilities.

It allows us to keep bolting on solutions. All data is in the cloud if customers want more customized solutions for analytics.

The more sophisticated customers can look at the data and use it to improve their operations, and we're getting better at offering professional services for those who don't have the time to analyze their data.

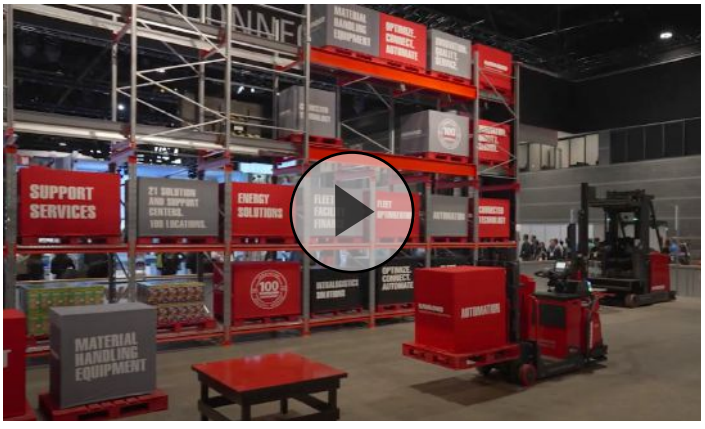
Raymond incorporates some interoperability

How does Raymond handle multi-vendor setups and interoperability?

Buena-Franco: We're pretty agnostic. The navigation package and automation equipment could be from different vendors, but we want to make [data management] very transparent.

We've been around for 100 years, and we work with particular technology partners for AGVs, tow trucks, and palletizers, and different ones for storage or high racks. We work with sister company Bastian, integrating middleware for navigation, bulk handling, and third-party integration.

There are more sophisticated "handshakes" between autonomous systems such as a palletizer arm.



We can handle all that integration, from the WMS taking orders down to different navigation and mission packages. The Bastian suite can make it work.

The last thing people want is a partitioned solution. We deploy a courier of different navigation packages and third-party equipment so you don't have to see a facility layout in one software and robots in another.

Gone are the days when you deliver a pallet of technology and tell the customer to do all the installation. Even when our systems are bought outright, there's an expectation of service.

What kinds of customers are seeking the latest automation? Is it all e-commerce?

Buena-Franco: We're seeing 3PLs [third-party logistics providers] that would like to have remote capabilities and have labor constraints.

We can increase the autonomy level of a fleet by assigning an experienced operator to manage it. He or she can respond to an AGV calling for help and manually operate it, then switch it back to automatic mode after the assist.

But we don't stop there; we're also investigating remote operation, so a robot can be rescued from a remote station.

We're also hearing more from general industry. Unloading trucks is something we're investigating.

Another area is automating low-level order picking. How do we optimize movement? We have some functions, such as horizontal movement and directed picking. This way, the operator only has to focus on doing the right pick. This increase the number of picks and reduces errors at the same time.

Then, what if we were to remove the operator and do the pick also? Finding labor is still a problem, so finding a solution to automate the pick makes economic sense. This is a field where highly selective vision systems are still being developed, but it looks promising.

Data analytics and AI still developing

What technology improvements would you like to see?

Buena-Franco: We share with our sister companies and engage with technology providers for vision and motion control. We facilitate networking and R&D to improve components.

Machine vision is not just useful for pallet and case detection or autonomy, it could also help tell if pallets of different sizes are damaged.

There's some interest in artificial intelligence and machine learning. It takes a long time to create a library for perception, and it would be great to do learning faster for staging, loading, and unloading. It's still early yet for AI technologies.

We collect so much information, it would good to automatically turn more of it into actionable insights with analytics. We're evaluating simulation and digital twins, which we already use at an early stage, for training systems.

There has been a lot of talk about Chat GPT benefitting human-machine interaction. What do you think?

Buena-Franco: The most successful implementations of automation have been when we can ensure that labor is integrated into the process upstream and downstream for materials flow.

It's about good change management and making robotics and automation more user-friendly, more collaborative. There's definitely an opportunity.

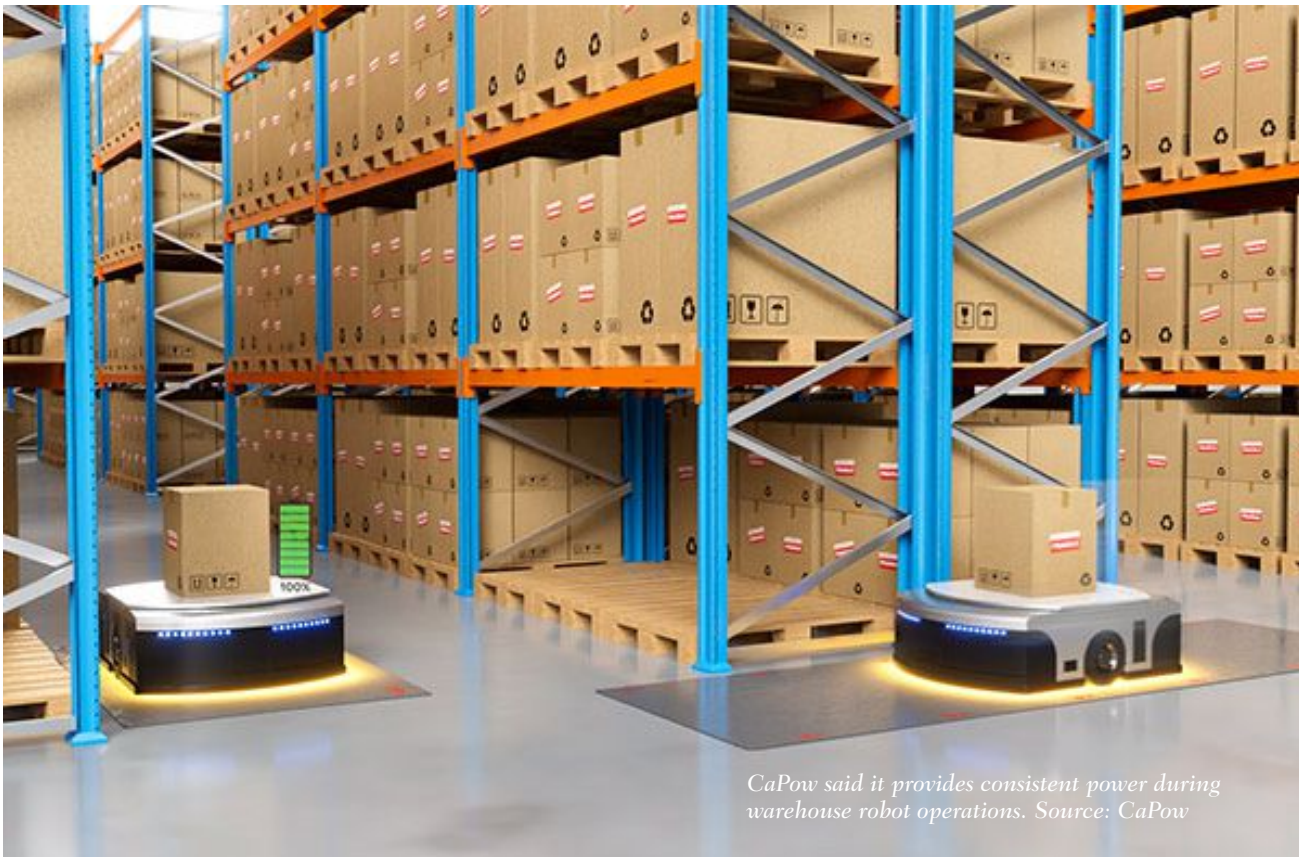
In the latter half of this year, we're investing in hiring and training people, increasing manufacturing capacity, and making it even easier for dealers and customers to work with us. •

Eugene Demaitre is editorial director of Robotics 24/7.

CaPow Brings Constant Power for Mobile Robots to the U.S. With Partner JLC Robotics

CaPow said its Genesis system reduces the need for oversize fleets or battery storage.

BY EUGENE DEMAITRE



CaPow said it provides consistent power during warehouse robot operations. Source: CaPow

Developers have been working to free robots, first from being bolted down, then to being tethered to a power outlet, and now from needing to return to a dock to recharge. CaPow, which said it delivers perpetual power to robotic fleets, recently announced its expansion in the U.S. with help from partner JLC Robotics LLC.

"We are honored to be partnering with CaPow," stated Jamie Callihan, president of JLC Robotics. "Their vendor-agnostic perpetual power solution for mobile robot fleets is a true game-changer."

JLC Robotics is a leading distributor of materials handling systems including the Thouzer automated guided vehicle (AGV). The Erlanger, Ky.-based company said its national reseller network can help manu-

facturers alleviate labor shortages with automation.

CaPow provides perpetual power

CaPow said its technology is based on nearly two decades of research, plus an extensive patent portfolio from its team of scientists. The Beersheba, Israel-based company said its "battery-free" system provides constant power flow to mobile robots. This eliminates charging dowtime and reduces both upfront costs and the total cost of ownership for warehouses and factories, it claimed.

"The charging systems on the market today have built-in limitations and inefficiencies," said Prof. Mor M. Peretz, co-founder and CEO of CaPow. "To charge a robot, it needs to stop working, costing an operation time and impacting its workforce, and this has made achieving the full potential of mobile robots impossible."

"There were no surprises from physics when we created the concept of energy on the go, but to overcome the challenge of fast, dynamic power consistently while a robot travels, it was a real breakthrough," Peretz told *Robotics 24/7*.

With constant power, operators can remove charging stations to free up warehouse or factory space, and it reduces or eliminates the need to store batteries.

"Charging on the go can translate to safety," Peretz noted. "One customer had rented a loft with 40-ft. containers storing end-of-life batteries. That's like a ticking time bomb. We provide customers the opportunity to reduce the size of the batteries or even the option of using no battery."

He cited several incidents where well-known mobile robot brands had problems or even caused warehouse fires.

JLC marks start of U.S. expansion

"Since CaPow Genesis solves so many of our clients' problems at once, we are already seeing a huge demand for it," Callihan added. "There's nothing else like this on the planet, and for us to say we are excited to share CaPow with our clients would be an understatement."

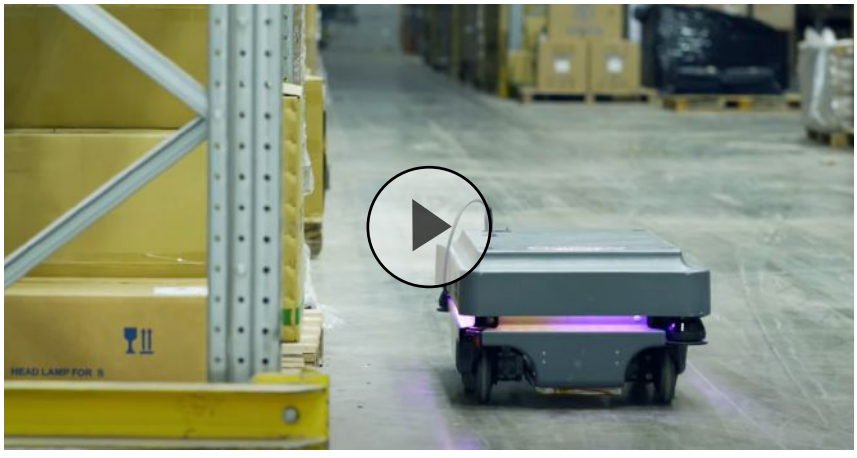
CaPow said its Genesis system enables 100% operational capacity at all times and eliminates the need for a larger robot fleet to compensate for robots that are charging. The company said facility operators can easily integrate its scalable system into existing or newly designed mobile robots.

"With perpetual power in motion, we are creating opportunities and use cases for mobile robots that simply hadn't even been considered previously," Peretz added. "Since we came out of stealth mode, we learned that people aren't really looking for charging solutions; they want more efficient warehouse operations, and their first priority is uptime."

CaPow said Genesis is now available to facilities operators looking to effectively manage their mobile robotic fleets, as well as mobile robot manufacturers.

"We've already had a presence in Europe, where sustainability regulations are starting to be enforced," said Peretz. "We are excited for our first partnership with JLC and to bring nonstop operational capabilities to operators across the U.S." •

Eugene Demaitre *is editorial director of* Robotics 24/7.



ResGreen SimuPath Uses Unreal Engine to Optimize Materials Handling Robots

New product integrates video game tool for warehouse simulation, as ResGreen also offers YOLO algorithm for inventory management.

BY ROBOTICS 24/7 STAFF

SimuPath uses video game technology to accurately build 3D simulations of facilities.Source: ResGreen Group International

ResGreen Group International Inc. last month introduced SimuPath, a simulation program intended to improve manufacturing and warehouse productivity. It uses Unreal Engine to create 3D representations of facilities that accurately reflect their physical dimensions and structures.

SimuPath's artificial intelligence can help determine the best routes for material handling, and it relays the information to ResGreen's BigBuddy, PullBuddy, and LilBuddy robots, said ResGreen. It can also send data to other agents in the virtual environment, such as drones or human workers, the company said in a release.

"By leveraging AI, robotics, and high-powered game engine simulations, we are creating a future-ready solution for our customers that not only significantly improves their current operations, but also offers a new vision of how effective and efficient their assembly, delivery and picking processes can be," said Parsh Patel, CEO of ResGreen. "We are confident that our SimuPath program will set new benchmarks in cost-effectiveness and place our clients at the forefront of their industries."

SimuPath offers two modes

ResGreen said SimuPath will be available in two simulation modes:

Mode A – Fixed Structure: This mode presents a static, digital replica of a warehouse or plant, with elements such as racks, storage containers, and machinery firmly set in place. The AI algorithms then process the facility's current arrangement and devise the most efficient pathways for movement, said the company.

The program analyzes numerous factors, including shortest paths, product weight, and frequency of access, to determine the optimal routes. This mode is particularly beneficial for existing facilities that have numerous fixed structures that cannot be moved, ResGreen noted.

Mode B – Full Simulation:

SimuPath's full simulation mode is more dynamic and interactive and enables materials to be moved around a facility according to specified rules.

In this mode, SimuPath reconfigures the facility by shuffling the position of objects and equipment to achieve maximum efficiency, according to ResGreen. This model encourages a fluid and adaptive approach to manufacturing and warehouse management.

SimuPath also features a playback mode that allows customers to get a firsthand of how the program will improve their operations in a simulated 3D environment. By using a virtual reality (VR) headset, the immersive experience can show AI and robotics increasing productivity and accuracy, while reducing human errors, the company explained.

YOLO to help with inventory management

ResGreen last week also announced its "You Only Look Once" or YOLO algorithm for identifying low-stock or vacant storage areas.

"YOLO's renowned real-time, single-pass, object-recognition framework lays the foundation for predictive analytics, dynamic resource allocation, and continuous operational improvement – putting us at the forefront of intelligent manufacturing and warehouse management," said Patel.

The system offers sub-millisecond detection, shares data for inventory oversight, and can track the stocking of multiple objects concurrently, said the company. Users can also configure its sensitivity or granularity level and get predictive models for automated replenishment planning.

About ResGreen

Shelby Township, Mich.-based ResGreen Group International Inc. (RGGI) claimed that it is a pioneer in the "convergence of Industry 4.0 and the human-centric principles of Industry 5.0, revolutionizing manufacturing with cutting-edge mobile robots and AI."

The company's stated mission is "to bring these technologies to small and medium companies, bridging the gap with industry giants." It said it integrates multi-platform communication, optimizing workplaces with AI, simulations, and collaborative human-robot interfaces.

ResGreen also offers to simplify robotics integration, offering support and training. It said its experienced team aligns with the Internet of Things (IoT), cloud computing, and analytics standards. By combining technologies, the company said it can help businesses be competitive by boosting productivity, reducing costs, and enabling data-driven decisions. •

MOV.AI, Advantech to Offer Software, Hardware for Mobile Robot Deployments

The partners said they want to make both development and deployment of autonomous mobile robots easier.

BY ROBOTICS 24/7 STAFF

MOV.AI and Adventech are jointly offering their technologies. Source:Advantech

Robotics manufacturers are challenged to keep up with growing demand for autonomous mobile robots, or AMRs. Advantech Co. and MOV.AI announced that they are collaborating to streamline robot creation by providing manufacturers and integrators access to their industrial computing technology and AMR software, respectively.

The COVID-19 pandemic and ongoing labor shortages have created a surge in demand for mobile robots, which offer operational efficiency and flexibility, noted MOV.AI. AMR shipments increased by 53% in 2022 and could grow at an annual rate of about 50% through 2027, resulting in a total of 4 million installed units, according to Interact Analysis.

In addition, the analyst firm predicted that revenue could grow by 30% to 40% annually between 2022 and 2027. With only 14% of warehouses having adopted at least one order-fulfillment AMR as of 2021, "the potential for futher expansion is significant," said MOV.AI and Advantech.

Advantech provides ruggedized hardware

Founded in 1983, Advantech offers hardware, software, embedded systems, design services, systems integration, and global logistics support. The Taipei, Taiwan-based company has an office in Milpitas, Calif., and said it supports a wide range of applications and industries.

Advantech said its edge computers are optimized for computing performance, functionality, and ease of deployment. They include the latest Intel processors and offer strong I/O flexibility to deliver optimal efficiency in multiple vertical markets, including automation, manufacturing, logistics, retail, and transportation, it said.

One such product is the UNO-238 V2, a compact Internet of Things (IoT) edge computer featuring a 12th Gen Intel Core i Processor and DDR5 SODIMM for high-speed multitask computing and data transfer. This device has a compact form factor and optimized I/O design, making it suitable for most factory scenarios, said Advantech.

The UNO-238 V2 features a fanless and ruggedized design for challenging industrial environments. It can withstand a wide operating temperature range of -20 to 60°C (-4 to 140°F). With compatibility for terminal blocks, the UNO-238 V2 offers

"excellent flexibility for electrical wiring," the company claimed.

In addition, the system incorporates CANBus and supports M.2 B/M/E-Key for storage and wireless communication for zero-latency data exchange, as well as a stable connection between edge devices and the cloud. Advantech noted that the UNO-238 provides a "robust and reliable" option for makers of automated guided vehicles (AGVs) and AMRs.

Another product, Advantech's MIC-770 V3, is a compact fanless system powered by a 12th Gen Intel Core i socket-type (LGA1700) processor with the Intel R680E chipset. It provides high-performance computing, multiple I/O interfaces, and flexible expandability with the integration of i-Modules and iDoor technology.

For example, the MIC-770 V3 equipped with the MIC-75GF10 expansion module is compatible with the SKY-MXM-A2000 MXM GPU card, said Advantech. This provides machine vision and autonomous navigation capabilities for various applications, including wafer box handling, material handling, robotic arm operations, and more.

MIC-770 V3 also supports WISE-Edge365, which enables remote management for status monitoring and anomaly detection. With these features, the MIC-770 V3 can be deployed for various edge artificial intelligence of things (AIoT) applications as a data gateway or industrial controller, said Advantech.

MOV.AI software is based on ROS

MOV.AI provides software and a Web-based interface for building, deploying, and running intelligent robots. The MOV.AI Robotics Engine Platform is based on the Robot Operating System (ROS) and provides AMR manufacturers and automation integrators with enterprise-grade tools including navigation, localization, and calibration.

The Tel Aviv, Israel-based company said its platform features a visual Integrated Development Environment (IDE) based on ROS, as well as off-the-shelf algorithms and integrations. It also offers interoperable fleet management, flexible interfaces with enterprise resource planning (ERP) and warehouse management systems (WMS) software, and cyber-security compliance.

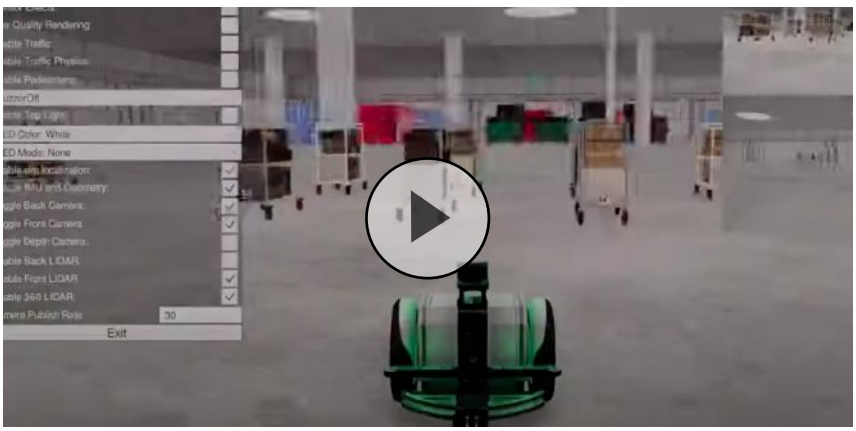
"The growing demand for automation creates a need for secure interoperable systems that can be easily deployed and easily adapted to changing business needs," said Motti Kushnir, CEO of MOV.AI. "We are excited about the collaboration with Advantech, as it provides our customers with comprehensive solutions that fit into a wider automation environment, providing continuing high value."

Partners promise faster AMR development

The integration of Advantech's rugged hardware with MOV.AI's Robotics Engine Platform is intended to help businesses develop and deploy mobile robots. The companies said their collaboration will address the growing need for faster time-to-value, flexibility, improved efficiency, and higher productivity in manufacturing and logistics.

"Advantech is excited to cooperate with MOV.AI, and we look forward to providing an advanced state-of-the-art AGV/AMR solution in the robotics segment worldwide," said David Jen, associate vice president of Advantech's Industrial IoT Group. "The key aspect of our collaboration is to ensure the interoperability of AMR ecosystem offerings and provide more comprehensive solutions to our customers."

Advantech's competencies in hardware design and manufacturing and MOV.AI's expertise in ROS-based software will result in quicker and more efficient AMR deployments, said the companies. •



Site Maps Feature Joins Brain Corp's BrainOS to Give Facilities Managers Visibility Into Robot Operations

Site Maps provides real-time visual representations of a site to help optimize routes, plan schedules, and maximize coverage for BrainOS-powered robots.

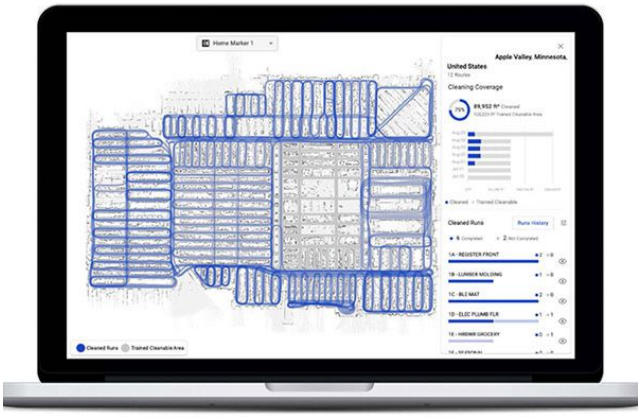
BY ROBOTICS 24/7 STAFF

Brain Corp announced the Site Maps feature for its BrainOS software for autonomous mobile robots, or AMRs. The company said it offers insights to facility managers about operational efficiency and proof of work.

A major challenge for facilities managers is determining what work has been completed or not. "This is especially true when it comes to facility cleaning and trying to understand what areas have been cleaned and what tasks still need attention," said Brain Corp.

The San Diego-based company said that AMRs using BrainOS can provide data insights and tools so that this information is easily accessible.

"Site Maps have been a great way for our customers to receive a more comprehensive story of their operations from the data shared by robots," said Nicole Holzman-Schneider, a customer success specialist at Tennant Co. "This has enabled our customers to really break down their progress week over week so that they are more intelligent and efficient with their operations."



Site Maps is available through the Web. Source: Brain Corp

BrainOS Site Maps to help tune operations

The new Site Maps feature extends the visibility provided by BrainOS by providing a visual representation of an environment, according to Brain Corp. It said the enhanced data visualization can help facilities managers to better understand, in real time, the progress of operations.

Through accessing these visualizations, sites can train more efficient routes for their robotic fleets, plan optimized schedules, and identify areas that need additional attention to maximize coverage and reduce overlaps, said Brain. The feature also offers new capabilities for the BrainOS suite, such as performance grades and tables that summarize how well robots completed their operations in a facility during given a week.

Site Maps can be easily accessed through the Web-based BrainOS Fleet Ops Portal, the BrainOS Mobile App, and e-mail reports, said Brain Corp. This provides flexibility and convenience for monitoring and managing cleaning operations remotely.

BrainOS customers can contact their equipment manufacturers to enable Site Maps for their facilities, said the company.

Brain Corp claimed that its BrainOS artificial intelligence software powers more than 30,000 AMRs, representing the largest fleet of its kind in the world. Brain Corp said OEM partners use its cloud-connected platform to build scalable, self-driving robots to clean floors, move inventory, and sense environmental data, automating workflows for end customers. •

Orgill Picks Numina Group for Fulfillment Automation in New Distribution Center

Orgil has selected the RDS warehouse execution and control platform and Geek+ PopPick to enhance customer service.

BY ROBOTICS 24/7 STAFF

Numina Group is integrating Geek+ robots and other technologies for Orgill. Source: Geekplus Americas

Orgill Inc., an independent hardlines distributor, had outgrown its current warehouse in Tifton, Ga. It was looking to not only add square footage, but also to explore new technologies to increase productivity and improve worker and customer experiences. The company said it has partnered with Numina Group to design and deploy automation for order fulfillment at its new 800,000-sq.-ft. distribution center in Tifton.

"One of the most important commitments we fulfill is to get our customers the products they need, when they need them, and at a price that is going to help them maintain and grow their profitability," said Boyden Moore, president and CEO of Orgill, in a release. "Having an efficient,

state-of-the-art distribution network is central to our ability to fulfill this commitment."

Founded in 1847, Orgill serves hardware stores, home centers, professional lumber dealers and farm stores throughout the U.S. and Canada. The Collierville, Tenn.-based company also has a presence in over 50 countries and said it is the industry's fastest-growing independent distributor.

Orgill invests in innovation

Orgill said its new facility will replace the current one and become part of the company's network of eight full-service distribution centers. It has sites in Inwood, W.Va.; Sikeston, Mo.; Hurricane, Utah; Kilgore, Texas; Post Falls, Idaho; Rome, N.Y.; and London, Ontario.

The company said its investment in the new facility will enhance its distribution capabilities to its network of 12,000 retailers. Orgill said it will maintain one of the newest and most advanced distribution networks in the hardware and home improvement industry.

"We are taking advantage of every opportunity to build technology and new distribution techniques into this facility that will help us create efficiencies for both our team and our customers," said Randy Williams, executive vice president of distribution at Orgill. "The investments we are making in this facility will ultimately help us get products to our customers more efficiently."

According to Williams, Orgill's new facility is scheduled for completion and full operation in June of 2024.

Numina to integrate automation, multiple systems

Orgill said it chose Numina Group as systems integration partner for facility planning, sizing, layout, and technology selection and implementation. Founded in 1986 by Dan Hanrahan and Mark Woodworth, Numina said it has decades of experience in warehouse design, warehouse software, material handling equipment, systems integration, and implementation services for midsize to large enterprises.

Numina Group's Real-time Distribution System (RDS) is a Tier 1 warehouse execution and control system (WES-WCS). The company's order-fulfillment automation module will manage picking, packing, and shipping for all repacked orders and manage and synchronize all material handling tasks at Orgill.

Numina's team is responsible for implementing the Geek+ PopPick goods-to-person (G2P) systems, Victory voice picking, and a zone route pick module. It will also deploy Pakt print and apply labeling automation, transport conveyor, and high-speed sortation.

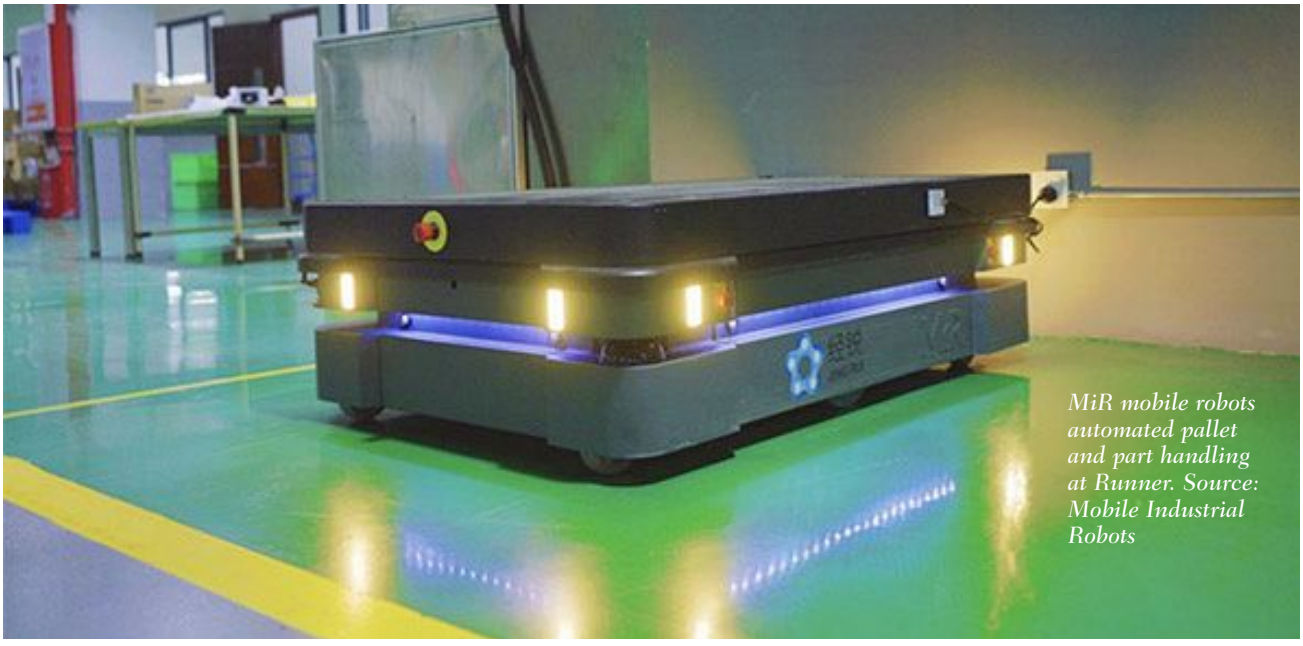
By combining Numina Group's RDS WES-WCS software with Geek+'s PopPick and Numina's pick, pack, and ship automation, Orgill projected that it will be able to achieve the same throughput levels with significantly less labor.

"We are honored to work with Orgill in designing a world-class automated warehouse and provide a scalable high-performance warehouse automation solution to support their business growth," said Andy Recard, chief operating officer of Numina Group. "It is exciting to work with a company that embraces all the advances taking place in warehouse technology."•

Runner Group Automates Internal Logistics for Kitchenware With MiR Robots

Runner has built a smart factory using Mobile Industrial Robots systems in three distinct but coordinated groups.

BY ROBOTICS 24/7 STAFF



MiR mobile robots automated pallet and part handling at Runner. Source: Mobile Industrial Robots

Runner Group, a manufacturer of kitchenware and sanitaryware, needed more efficient internal transportation to respond to changing consumer demand. The Xiamen, China-based company decided to build a smart factory and add automation in the form of 12 autonomous mobile robots, or AMRs, from Mobile Industrial Robots ApS.

"The implementation of automatic logistics processes empowers us to take a leading position in the sector," stated Weyland Fambu, director of intelligent operation development platform and intelligent manufacturing at Runner. "Furthermore, the capability of automated logistics processes serves as a key indicator of Runner's long-term competitive edge in manufacturing."

Runner modernizes production, logistics

The rise of smart homes has led to heightened consumer expectations for quality, style, energy efficiency, and environmental sustainability, noted Runner. "Conventional basic sanitaryware products are entering a transformative era characterized by 'technology and ingenuity,'" leading to new requirements for innovative product design, manufacturing, and delivery, it said.

Not only did Runner design and construct a new factory to upgrade production, but it also decided to transform its logistics processes within conventional workshop lines with automation.

MiR robots work in three coordinated groups at Runner. Source: Mobile Industrial Robots

The company said it has focused these efforts in its Intelligent Manufacturing Center for Kitchenware & Sanitaryware, which caters to globally recognized industry players.

The center is equipped with a fleet of 12 mobile robots, including six MiR250 AMRs, two MiR600 robots, and other systems. They operate in three distinct groups with specialized capabilities, explained Mobile Industrial Robots.

The first group includes robots that lift assembly parts from a shelf to a cart, the second collects finished products, and the third empties delivery pallets. The MiR fleet management software coordinates the three groups, along with the RCS3.0 robot control system.

In addition, Runner has developed a transportation management system (TMS) to integrate robot communications with its manufacturing execution system (MES) and warehouse management system (WMS). This facilitates the efficient deployment of information and hardware resources, coordinates between the fleet and the production line for high-priority tasks, and allows for smooth scheduling and efficient operations, said Runner and MiR.

"MiR AMRs feature intelligence, safety, and user-friendly operation," said Su Dapeng, senior technical manager at Runner Corp. "With the integration of our MES for fleet control, the fleet operates seamlessly during routine tasks, resulting in a significant improvement in production efficiency and labor performance."

MiR overcomes environmental challenges

Transportation process points tend to be scattered in kitchenware and sanitaryware assembly workshops, said Mobile Industrial Robots. In addition, production lines are not dedicated continuously to a single product but include several small workstations.

As a result, Runner needed materials handling systems that can adjust their workflows to accommodate changes in real

AMRs automate the movement of pallets and assembly parts without extra infrastructure. Source: Mobile Industrial Robots

time. The manufacturer's TMS and MiR robots allowed for flexible operations.

Unlike automated guided vehicles (AGVs) or some semi-autonomous forklifts, AMRs do not require the installation of rails or other infrastructure modifications, noted MiR.

Each AMR cart includes advanced laser scanners, 3D cameras, other built-in sensors, and software, it added. This equipment enables the AMRs to analyze the environment along their routes, avoid obstacles, and dynamically plan and adjust routes.

Mobile Industrial Robots said that its AMRs can operate for more than 12 hours at a time in the current deployment scenario. In addition, the delivery rate of assembly parts can reach up to eight times per hour, per set, and the finished product collection rate can reach four times per hour, per set, said the Odense, Denmark-based company.

Mobile robots transform the workplace

Runner said it successfully helped the majority of its transportation workers to acquire AMR operation skills. Mobile Industrial Robots said its intuitive graphical programming interface allowed frontline operators to start working with the robots without prior programming experience.

Operators could collaborate with the MiR AMRs through Web-based controls and an intelligent device such as a tablet. Runner's staffers were able to become proficient AMR operators after just a few days of training by MiR's technical support and Xiamen Jing Rui Precise Equipment Co.

Runner reported that the AMR implementation significantly reduced employees' workloads and enhanced their professional skills. The smart factory, which includes a safer environment and automation-assisted tasks, also helps it attract and retain scarce talent in a competitive market.

Runner expressed confidence that MiR's automation of its logistics processes will yield a return on investment (ROI) in two to three years. The company plans to expand its deployment to other facilities in its network and to build more smart factories.

"The company places emphasis on domestic circulation and promoting the concept of 'dual circulation,'" Runner said. "To achieve this, we have set up industrial bases and overseas companies in various locations such as Xiamen, Zhangzhou, Ningbo, Shanghai, Taipei, Thailand, and the United States. These strategic moves are aimed at facilitating the high-quality development of the group." •

Rockwell Automation Agrees to Acquire Clearpath Robotics, OTTO Motors

Rockwell says mobile robots will help it extend its end-to-end automation offerings for manufacturing and logistics.

BY ROBOTICS 24/7 STAFF

The market for autonomous mobile robots, or AMRs, in manufacturing could grow about 30% per year over the next five years, reaching an estimated size of $6.2 billion by 2027, according to Interact Analysis. AMR vendors are continuing to consolidate, with Rockwell Automation Inc. saying on Sept. 5 that it has signed a definitive agreement to acquire Clearpath Robotics Inc.

"Transporting parts and materials to assembly lines and between manufacturing cells is one of the industry's most complex and inefficient tasks, often resulting in production bottlenecks," said Rockwell. "Autonomous production logistics will transform the workflow throughout a manufacturing plant, enabling substantial reductions in cost and greater operational efficiency."

"Autonomous mobile robots ... are the next frontier in industrial automation and transformation, and this acquisition will supercharge Rockwell's lead in bringing the Connected Enterprise to life," the company added.

OTTO Motors' family of mobile robots and software is joining Rockwell's industrial automation portfolio. Source: OTTO Motors

Rockwell Automation pursues global leadership

Milwaukee-based Rockwell Automation claimed to be "the world's largest company dedicated to industrial automation and digital transformation." The company employs about 28,000 people in more than 100 countries.

"Rockwell and Clearpath together will simplify the difficult and labor-intensive task of moving materials and product through an orchestrated and safe system to optimize operations throughout the entire manufacturing facility," stated Blake Moret, chairman and CEO of Rockwell Automation.

"The combination of autonomous robots and PLC [programmable logic controllers] has long been a dream of plant managers in industries as diverse as automotive and consumer packaged goods," he added. "With Clearpath, Rockwell is uniquely positioned to make that dream a reality across virtually all discrete and hybrid verticals, optimizing planning, operations, and the workforce." Rockwell said it expects the Clearpath acquisition to contribute a percentage point to its fiscal 2024 revenue growth.

Clearpath Robotics, OTTO Motors recognized for innovation

Founded in 2009, Clearpath Robotics got its start offering

Company	Acquirer	Date
iFollow	stow Robotics	May 2022
FRED Automation	Barcoding	Jan. 2023
Berkshire Grey	SoftBank Group	March 2023
6 River Systems	Ocado Group	May 2023
Magazino	Jungheinrich	Aug. 2023

Other noteworthy AMR acquisitions of the past year.

technology to global research and development markets. In 2015, the Kitchener, Ontario-based company launched its OTTO Motors industrial division.

"Industrial customers are under ever-increasing pressure to do more with less," said Matt Rendall, co-founder and CEO of Clearpath. "Autonomous production logistics is becoming a necessity to meet targets and stay competitive."

"Together, we will create safer and more productive workplaces with autonomous technology," he said.

OTTO Motors offers AMRs and navigation and fleet management software. It said they can increase throughput and reduce costs by ensuring that components and subassemblies are in place when needed and by transporting finished goods to a truck or warehouse upon completion.

In March, Fast Company named OTTO Motors as one of the Most Innovative Companies for 2023. In May, Mitsubishi Electric Corp. invested an unspecified amount in Clearpath.

Partners build advanced materials handling portfolio

The companies said the combination of Rockwell's partnerships in fixed robotic arms, systems such as Independent Cart Technology, and leadership in PLCs with OTTO Motors' AMR capabilities will create a portfolio of advanced material handling offerings.

Data from Rockwell's offerings and OTTO Motors' AMRs will be used in artificial intelligence-powered software-as-a-service information management applications, such as those of Rockwell's Plex and Fiix businesses. Rockwell said it will deliver a unified solution for manufacturing, enabling autonomous execution and optimization to increase efficiency and allow for traceability and real-time adjustments.

The combined technology will also amplify Kalypso's production logistics consulting practice.

While the terms of the acquisition were not initially disclosed, it will be funded by a portion of the proceeds from the sale of Rockwell's nearly $1 billion investment in PTC. Goldman Sachs & Co. served as Rockwell's financial advisor.

The deal is subject to customary regulatory approval and is expected to close in the first quarter of Rockwell's fiscal year 2024. At close, Clearpath will report to Rockwell's Intelligent Devices operating segment.

Editor's note: Reports on Sept. 12 said that Rockwell paid up to $600 million for Clearpath, subject to certain financial performance conditions. According to *The Globe and Mail*, Rockwell put up a winning bid in comparison with competitors, and it expects Clearpath to generate about $90 million in revenue next year. •

Align Production Systems, Kollmorgen Partner to Advance Automated Guided Vehicles

APS and Kollmorgen plan to combine their expertise for next-generation AGVs.

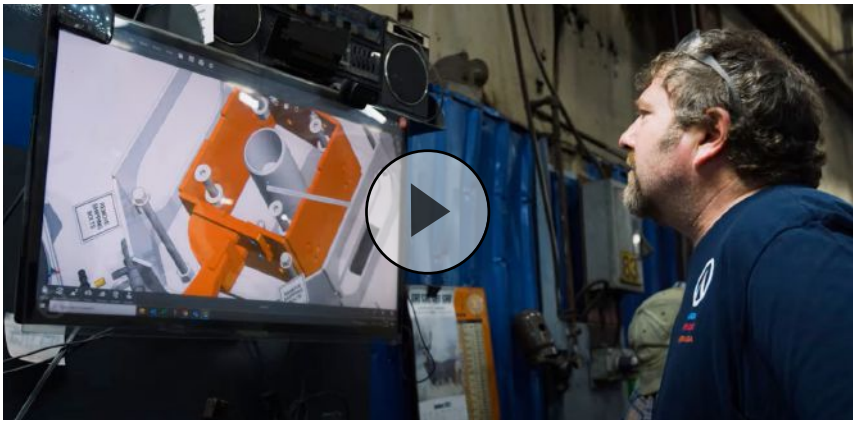
BY ROBOTICS 24/7 STAFF

APS and Kollmorgen recently collaborated on an AGV for agriculture. Source: Align Production Systems

Align Production Systems, a leading innovator in material handling systems, has announced a strategic partnership with Kollmorgen, which is known for its vehicle control products. The companies said the collaboration will "revolutionize" automated guided vehicles, or AGVs.

"Our partnership with Kollmorgen marks a pivotal moment in the AGV technology for heavy industry," stated Jason Stoecker, CEO of Align Production Systems (APS). "As a premier provider of heavy industrial solutions partnered with a pioneer in AGV technologies, APS will help lead heavy industry into the autonomous age."

St. Louis, Mo.-based Align Production Systems said it is committed to enhancing efficiency, safety, and productivity across all manufacturing industries. The company provides custom engineering services, industrial automation components, and AGV software.



APS looks to the future of AGVs

"AGV systems have become an integral part of smart manufacturing while keeping safety as a top concern, enabling businesses to optimize their operations, reduce human intervention, and significantly increase production," said Align Production Systems.

The partners said they will combine APS's expertise in designing AGVs with Kollmorgen's servo motors, drives, and automation control platforms for the next generation of the technology. They said their goal is "to redefine the standards of how large and heavy products are moved" in factories.

Align Production Systems and Kollmorgen said they are focusing on the following:

- **Enhanced navigation:** The partners plan to implement advanced navigation systems that allow AGVs to move more fluidly in complex environments with lidar sensors.
- **Scalable solutions:** They said they will create systems that can increase fleet size and weight capacities that can serve numerous industries.
- **Optimized energy efficiency:** Kollmorgen will apply its expertise to ensure that AGVs operate longer and more efficiently, reducing downtimes and boosting overall productivity.

Align Production Systems and Kollmorgen said they are "committed to pushing the boundaries of AGV vehicle technology to ensure the future of AGVs is beneficial to customers."

Kollmorgen provides robot drives

Kollmorgen said its motion systems and components offer performance, reliability, and ease of use. The Radford, Va.-based company said it has deployed and supported AGVs and mobile robots for more than 50 years with "the industry's leading ecosystem of OEM and system integrator partners."

In August, Kollmorgen announced ATEX certification and IECEx/cETLus listing for its explosion-proof Goldline EBH 480 Vac servo motor.

The company also added the 24A drive to its AKD2G servo drive series to deliver higher amperage, provide configurable options, and support high-performance robotics applications.

"The AKD2G 24A delivers higher amperage for more applications," said James Davison, senior vice president/general manager at Kollmorgen. "This high level of flexibility and performance potential means customers aren't forced to mix and match drives. Simply put, the expanded AKD2G servo drive family now gives customers more power and control with less complexity." •

Cyngn Partners With Motrec to Launch Fleet of AI Powered, Electric Autonomous Tuggers

Cyngn will integrate DriveMod into the Motrec MT-160 tow tractor to enable electric, self-driving materials handling.

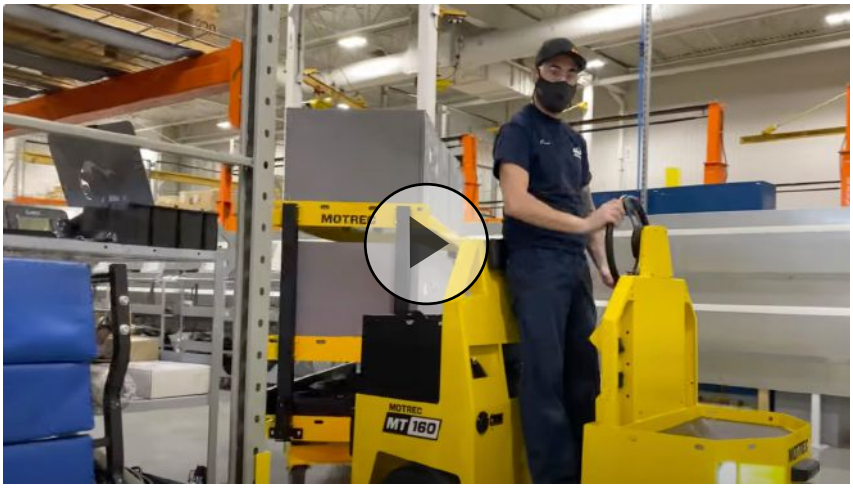
BY ROBOTICS 24/7 STAFF

Cyngn is integrating its self-driving technology with Motrec tow tractors and stock chasers to enhance their capabilities and performance. Source: Cyngn

Companies are collaborating to advance electric and autonomous vehicles for industrial fleets. are Cyngn Inc. this summer announced that it has partnered with Motrec International Inc. to integrate its DriveMod system into Motrec's autonomous tuggers.

"By joining forces with Cyngn, we are reinforcing our commitment to innovation while also meeting the evolving needs of our customers who have been actively seeking automation solutions," said Blair McIntosh, president and CEO of Motrec, in a press release.

"Motrec's MT-160 tow tractor, known for its robustness, durability, and maneuverability, offers an industry-leading 6,000 lb. of stable towing power," he added. "We are excited to bring DriveMod to our tuggers, enhancing our ability to deliver long-lasting products that will take productivity to the next level."



Motrec moves to serve global market

The global tow tractor market revenue was worth $1.96 billion in 2022 and could reach $2.88 billion by 2028, according to Research and Markets. The autonomous DriveMod Tugger will help transform hauling workflows, said Sherbrooke, Quebec-based Motrec.

By using the latest in autonomous vehicle (AV) technology for tasks such as transferring goods and delivering supplies, organizations can reduce safety risks and allow their workforce to focus on more valuable tasks, said the company. This shift can optimize efficiency and increase overall productivity in material handling operations, it noted.

Founded in 1988, Motrec International said it manufactures electric vehicles "to meet the exact needs of the biggest players in the industry."

As part of the partnership, Cyngn will integrate its DriveMod system with Motrec's MT-160 tow tractor, which is designed for efficient heavy-load towing operations. The self-driving vehicle will be capable of safely and autonomously hauling goods through complex commercial and industrial environments, claimed the partners.

Cyngn adds DriveMod to more vehicles

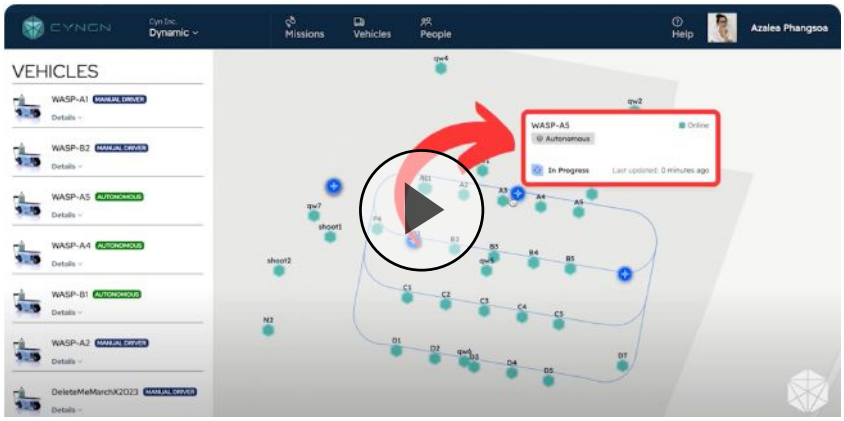
"We are excited to announce this significant milestone in expanding DriveMod to another vehicle form factor," stated Lior Tal, CEO of Cyngn. "Motrec's vehicles have already gained the trust of major industry players like General Motors, Tesla, Ford, and Chrysler, demonstrating their ability to meet the needs of some of the biggest organizations in the world."

"Their reputation for manufacturing high-quality industrial vehicles aligns perfectly with Cyngn's commitment to helping organizations tap into future-facing technologies and bring reliable autonomous solutions to their facilities," he said.

Menlo Park, Calif.-based Cyngn said it develops and deploys scalable, self-driving systems to allow existing workforces to increase productivity and efficiency. The company said it addresses significant challenges, such as labor shortages, costly safety incidents, and increased consumer demand for e-commerce.

Cyngn said it flagship product, the Enterprise Autonomy Suite, includes the following:

- DriveMod AV system
- Cyngn Insight customer-facing suite of AV fleet management, teleoperation, and analytics tools
- Cyngn Evolve internal toolkit that enables it to use data from the field for AI, simulation, and modeling. •



Thoro.ai Continues Work With Big Joe Forklifts and Nilfisk to Advance Autonomy Stack for Mobile Robots

The Pittsburgh-based startup's foray into logistics is part of CEO Patrick Mondi's vision to expand into new industries.

BY CESAREO CONTRERAS

The Big Joe Pallet Mover was featured at ProMat 2023. Source: Thoro.ai

PITTSBURGH—Spun out of Carnegie Robotics as part of an agreement with Nilfisk in 2020, Thoro.ai has spent the past three years forming new relationships and upgrading its services and technology for mobile robots. Earlier this year, it announced that it worked with Big Joe Forklifts to develop the Big Joe Pallet Mover.

This summer, *Robotics 24/7* visited Thoro.ai's headquarters in Pittsburgh, which is across the railroad tracks from Carnegie Robotics, to check out what the company has been working on.

"Our real focus as a company has been on taking some world-class technology and using it to apply to indoor industrial equipment that performs manual and repetitive tasks," Patrick Mondi, CEO of Thoro.ai, told *Robotics 24/7*.

The company's key differentiator is its autonomy stack, the technology that enables mobile robots to have the perception and navigation capabilities to move around environments, he said.

Thoro.ai's autonomy kit, which was originally developed in Carnegie Robotics' facility, was first featured in the Nilfisk Liberty SC50 Autonomous Scrubber back when the company launched. That robot is used to clean large venues, including hospitals, schools, and airports.

Moving beyond cleaning

When Mondi joined Thoro.ai as CEO in October 2021, he made it his mission to extend the company's reach into new applications.

"I wanted this company to be more than just an autonomous cleaning company," Mondi said.

That's what inspired Thoro.ai to partner with Big Joe and develop the Pallet Mover, which is designed for "floor-to-floor

pallet transportation and drop off." The companies specified that while the new mover is like a traditional lift truck, it also features an integrated tablet interface, lidar sensors, and a camera system that enables its autonomy.

"We are really proud of our partnership with Big Joe because it really embodies what Thoro can do," said Mondi.

The companies launched the pallet mover at ProMat in March, and the robot can be purchased online at Big Joe's website.

The Thoro.ai way

Thoro.ai's arrangements with Nilfisk and Big Joe highlight how it operates as a business – it works with original equipment manufacturers (OEMs) and provides them with the technologies to make their machinery autonomous.

"We can help them with our autonomy solutions because we have the team, we have the investment, and we have the know-how," Mondi said. "It really causes a great combination."

The company's technology is comprised of both hardware and software systems and supported by its cloud-based infrastructure, Mondi explained. Thoro also prides itself on its adherence to safety standards. The company highlighted that the Nilfisk SC50 meets the CSA/ANSI 336 safety standard for cleaning robots.

Thoro.ai has continued to work with Carnegie Robotics to develop custom-made hardware parts for its autonomy stack, which Mondi noted integrates seamlessly with Thoro.ai's software.

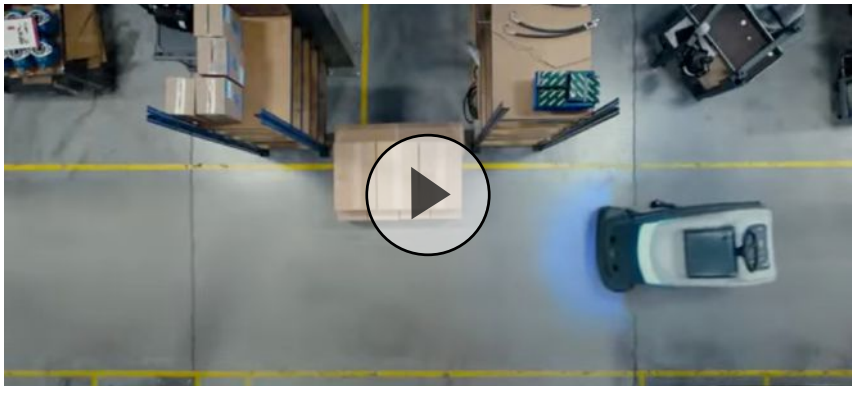
"That's how we're able to operate in so many diverse environments, from the busiest, most complex warehouses to empty school gyms and everything in between," he said.

While Carnegie Robotics is helping the company develop hardware and is an investor, Mondi stressed that it is a separate entity.

"We're totally independent from Carnegie Robotics, but it's a relationship we value," he said.

On the software front, Mondi highlighted both the company's autonomy advancements and cloud app, which customers can access to see important data and insights into how the machines are operating.

"It's more than just basic performance data," he said. "We're seeing a lot of interest on the logistics side, for example, in the use of the cloud app to provide insights and optimization of workflows. There's value to the insights our cloud app provides. It's very lightweight, and it's available for OEMs and their customers to use."



Mondi looks to the future

It's an exciting time for Thoro.ai as it begins to realize the benefits of operating in two different industries – cleaning and logistics, Mondi explained.

"What we're seeing is that some of the innovations on one benefits the other," he said.

For example, Mondi noted that Thoro.ai developed dynamic mapping software to account for the rapid changes in logistics environments. This allowed the company's robots to map environments more accurately as they moved around.

Thoro.ai has been able to apply that technology to its cleaning robots to allow them to clean in new environments and to clean more thoroughly in challenging environments.

"We're starting to see this mutually beneficial wheel of innovation emerging from the different environments and applications that we are involved in," said Mondi.

With the launch of the Big Joe Pallet Mover behind it, Thoro.ai is spending much of its time both continuing to support Nilfisk and SC50 and building interest in its new pallet mover. It's also in talks with some future OEM partners, Mondi said.

"We aim to continue to build the business with world-class partners like Nilfisk, Big Joe, and others in the future," he said. •

Cesareo Contreras *was associate editor at* Robotics 24/7.

IAM Robotics Rebrands as Onward Robotics to Reflect Business Evolution, Market Focus

Onward Robotics said its mission is to revolutionize order fulfillment and help clients move forward.

BY EUGENE DEMAITRE

Pyxis coordinates a Lumabot and a human picker with a wearable device. Source: Onward Robotics

IAM Robotics recently announced that it has changed its name to Onward Robotics, with a new logo, visual identity, and website. The Pittsburgh-based company said it has evolved from a developer of mobile manipulation systems to a provider of software and hardware for person-to-goods automation.

"This transition has been an exciting and transformational process for us," said CEO Lance VandenBrook in a press release. "Onward Robotics better reflects the organization's strong forward trajectory, our bold and purposeful team, and most importantly, our commitment to moving our clients and the global supply chain forward."

Founded in 2012, IAM Robotics had developed the Bolt autonomous mobile robot (AMR) and the Swift autonomous mobile manipulator. In late 2021, the company went into "stealth mode" to refocus its value proposition.

How IAM Robotics changed course

"I joined IAM Robotics in 2021, and the Swift AMR with a picking arm didn't have a lot of

traction," VandenBrook told *Robotics 24/7*. "Market data showed where the dollars were being spent, and we had to have a hard conversation with the technical teams.

Lance VandenBrook, CEO of Onward Robotics

"They had not yet solved how to pick from corrugated cartons, and after talking with the founders, we realized that we were three to four years from solving that problem and commercialization," he recalled. "We needed to do something different, and while the business had been around for almost 10 years, you have to have a solid story to raise capital."

"The goods-to-person market was a 'red sea,' with a lot of companies trying to get in," added VandenBrook. "But the person-to-goods space was a 'blue ocean,' with only Locus Robotics and 6 River Systems."

"We had a new version of Bolt, and some of the technology was already there," he said. "We repurposed it for a person-to-goods solution, and that was the beginning of our pivot as we got our team and investors on board."

Market responds favorably to Meet Me

Over the past year, the former IAM Robotics worked to create a new brand identity that embodied its new direction, as well as its experience with solving supply chain problems with mobile robotics.

"We started getting more customers, who got more excited," VandenBrook said. "We had clients look at our demonstration site last year."

In May, IAM Robotics emerged from stealth with the Meet Me system, which combined its Lumabot AMR, the Pyxis workflow management software, and wearable devices to help coordinate both robots and human associates. The company claimed that Meet Me enables warehousing, logistics, e-commerce, and manufacturing operations to increase productivity, mitigate risk, and scale without adding headcount.

The Meet Me person-to-goods system includes Lumabots (above) and the Pyxis software. Source: Onward Robotics

"Around the time we came out of stealth, 6 River Systems announced its acquisition by Ocado," said VandenBrook. "We were doing all of that [work around person to goods], but we were still getting questions about the picking arm, so we decided, 'Let's rebrand and better align to what we're doing and what we're about.'"

Labor shortages still drive robotics demand

Despite slowed economic and e-commerce growth and consolidation among mobile robot providers, VandenBrook expressed confidence in long-term demand for AMRs.

"We went through our own downsizing in Q1," he noted. "Investors were concerned about sizing the cost structure to make capital work. We made the right decision."

"In late 2022 and early 2023, it looked like troubling times for the robotics industry, but labor shortages aren't going away, and most end users we spoke with are still concerned about being 20% to 25% short on staffers," said VandenBrook. "Later, as

interest rates climbed, it had an impact on the real estate market. Small and midsize enterprises [SMEs] have to get more throughput in existing facilities."

A warehouse associate confirms a pick on a Lumabot. Source: Onward Robotics

"I also sit on the board of Diligent Robotics, which raised money this week," he added. "For both, we focused on our key tenets and the labor market. There has been a slowdown in investment, but the same challenges we had in 2021 will still exist on the other side."

Onward Robotics looks forward, stays focused

Mobile platforms may be similar, but Onward Robotics' software can provide agility for expanded applications, asserted VandenBrook.

"On a client visit, they said to me, 'There's nothing unique about your AMR; it's the Pyxis software and the Meet Me model for optimizing robots and people on the floor,'" he said. "It's also helping to optimize inventory, thinking about how to replenish product in pick modules."

"Some competitors have just been taking raw data from the warehouse management system [WMS] and dumping it into systems for the robots to find," VandenBrook said. "They're not optimizing paths. This week, I was in a warehouse that had just taken out a competitor's product because throwing in more robots just added to congestion."

He cited Onward's team's years of experience and thinking about how to increase throughput as it build software for specific tasks. VandenBrook added that the company understands that it can't automate everything and that it will need to integrate with other equipment in the warehouse, such as conveyors.

"As a trusted adviser, it's OK to say, 'That's not a good fit for us, and we'll find a partner,'" he said. "The other side of that coin is that early adopters have a lot of input into our product roadmap."

What sort of feedback have the early adopters provided?

"Some of them have very diverse clients, which have different picking needs," replied VandenBrook. "Returns and replenishment are always a challenge. As I've seen at Kiva Systems [where he was vice president of worldwide sales before it was acquired by Amazon.com], while every client is unique, you want at least 60% of what you do to be the same for everybody."

VandenBrook is meeting with the rest of Onward Robotics' executive team next week about its roadmap.

"We've built internal processes so that we go back and evaluate if there's an ROI [return on investment] every time we deploy capital," he explained. "Does it align with our strategy? We've had to say, 'No,' numerous times over the past two years; there's only so much 65 employees can do."

"I'm inspired every day by the bold and gritty Onward Robotics team," VandenBrook stated. "I'm incredibly proud of the momentum we've built, the way we're solving hard problems with innovative technology, and how we're moving onward and upward together." •

Eugene Demaitre *is editorial director of* Robotics 24/7.

stow Group Launches Movu Robotics Brand for Modular Warehouse Automation

Movu Robotics has a new headquarters and an Experience Centre to demonstrate its systems.

BY ROBOTICS 24/7 STAFF

Movu Robotics' product line includes mobile robots, picking systems, and pallet movers. Source: Movu Robotics

stow Group recently launched its Movu Robotics brand, which replaces the name "stow Robotics" and is intended to strengthen the company's robotics business unit as it meets increasing customer demand for storage automation and warehouse robots.

"Faced with challenges of labor shortages, cost increases, storage density, growing volumes, and [the need to improve] accuracy, companies are turning to robotics and automation for solutions," stated Jos de Vuyst, CEO of stow Group. "Movu Robotics offers an integrated ecosystem of standardized and scalable automation technology that speeds rollout and reduces risk for all kinds of customers."

He added that the company wants to "democratize material handling" by making adoption of robotics easier for warehouses. The global market for materials handling equipment could reach $350 billion (U.S.), according to Grand View Research.

By understanding the key

drivers of growth in robotics and automated storage and retrieval systems (ASRS), stow Group said it expects that Movu Robotics "will become an esssential player."

stow Group promotes automation

As labor shortages increase demand for automation, robotics vendors must show that they can improve accuracy, efficiency, flexibility, and profitability, as well as shorten lead times. stow Group said it has 40 years of experience with supplying logistics and materials handling systems, starting with racking.

The company established stow Robotics in 2021. It claimed that it has developed a portfolio of systems for pallets, bins, and items as energy-efficient and practical alternatives to stacker cranes.

Despite the potential benefits of robots and automation, many customers perceive them as being complex, expensive, and resource-intensive, needing long lead times for installation. Movu Robotics said it is addressing these concerns by making automation easier for the world's warehouses to adopt.

'Leaving no warehouse behind'

Movu Robotics' main vertical markets include e-commerce, fast-moving consumer goods (FMCG), and cold storage in Europe and North America. The stow Group unit said it plans to "deliver simple, standardized plug-and-play solutions that require less engineering and grant short lead times for execution, allowing customers to keep their operations running."

The stated goal of Movu Robotics is to ensure that "when it comes to opportunities for automation, no warehouse is left behind."

The company added that its new headquarters near Antwerp in Lokeren, Belgium, brings research and development, engineering, and production under one roof. It combines 5,000 sq. m (53,819.5 sq. ft.) for offices with 10,000 sq. m (107,639.1 sq. ft.) for logistics and manufacturing operations.

Movu Robotics has also built a "state-of-the-art Experience Centre," where it can demonstrate the latest technologies to customers and partners.

The company plans to employ more than 300 people across Europe and the U.S. by the end of this year. It said it expects order intake of more than €300 million ($320.4 million U.S.) in 2023.

Movu Robotics makes portfolio accessible

"Smart enough to make any operation feel simple and easy, Movu robots help to take a load off the customers' minds as well as their shelves," said Stefan Pieters, CEO of Movu Robotics.

"Our solutions are designed to make warehouse automation and robotics not only more accessible, but also more scalable," he said. "They will enable any warehouse around the world—big or small, regularly or awkwardly shaped—to be upgraded and become more productive, more efficient, and more successful."

Movu Robotics' warehouse automation portfolio includes the Movu atlas pallet shuttle, the Movu escala bin shuttle, and the Movu ifollow autonomous mobile robot (AMR) for pallet transport or collaborative picking. It also includes the new Movu eligo integrated robot arm, which is offered as a picking workstation for escala.

stow Robotics acquired iFollow SAS last year, in addition to Raiser Robotics in 2021.

In addition, the company offers load carriers and its own warehouse execution software (WES) to control and manage all of these systems. Customers

can "gain the key advantage of seamless integrated racking and robotics," said Movu.

The broad portfolio means that Movu's users have a single partner to talk to, providing efficient project management and reliable lead times, Movu claimed. Customers can also rely on a safe and resilient supply chain that assists in delivering high service levels, it said.

stow restructures

stow Group now has two independent brands: stow Racking and Movu Robotics. While both of these brands retain their independence, they can still help each other with expertise, technology, and global resources it said.

All of stow's robotics and automation products, business activities, and operations, including research and development, manufacturing, sales, and finance, will be under the Movu Robotics brand. This includes the ifollow AMR business.

The management team includes stow's de Vuyst and Movu's Pieters. Both units have board members with experience from logistics and other industrial sectors, said stow.

Modular subsystems for minimal TCO

Movu Robotics noted that it can integrate technologies in its portfolio into a single autonomous system as a solution, with components such as racking, shuttles or AMRs, software, Wi-Fi, and commissioning. This enables easy installation, adaptability to new business needs, and a minimal total cost of ownership (TCO), it said.

This approach makes upgrading warehouses easier, not only for existing users of logistics automation who want to upgrade their systems, but also for those taking their first steps to adoption, said Movu.

The standardized, modular design of Movu Robotics' systems maximizes flexibility and minimizes complexity, engineering costs, and the time for upgrades, the company asserted. It also allows for installations to start small and expand or contract as needed.

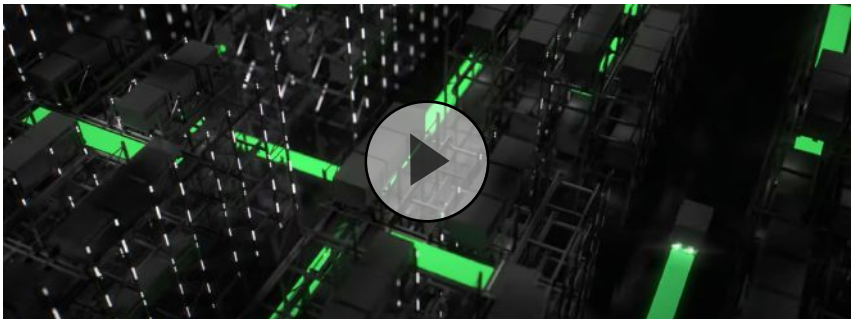
Movu works directly, through channel partners

As part of its strategy for not leaving any warehouse behind, Movu Robotics offers end users its products through a direct channel, which includes network of sales offices in main territories. It said it provides opportunities for small and midsize enterprises (SME) with as few as 5,000 pallet locations to automate.

The company also offers an indirect channel, in which Movu can provide fully functional storage subsystems to a systems integrator. Both approaches are intended to help address labor shortages and cost inefficiencies.

stow noted that it supports its customers with its four decades of industry experience and a global customer-service network.

In addition, Movu Robotics said it is constantly working on innovation and entrepreneurial thinking as a dynamic business unit. The company said it is planning its next product launch for 2024. •



Autonomous Lift Trucks Find a Road to Success With Hyster, Yale

Hyster and Yale discuss how they respond to market demand, as well as where autonomous lift trucks and mobile robots can provide immediate ROI.

BY EUGENE DEMAITRE

Mobile robots and autonomous lift trucks promise to improve flexibility and agility, but how can warehouse and factory operators be sure of reaping those benefits? Uncertainty has held back adoption of new technologies, but suppliers have recognized the challenge and are addressing it with easier-to-use systems and close collaboration with prospective customers.

Hyster-Yale Materials Handling Inc. provides manual and automated lift trucks plus accessories through its subsidiaries, Hyster Co. and Yale Lift Truck Technologies. Yale said at ProMat 2023 that it expects autonomous mobile robots (AMRs) to be as much as 50% of its business in the next few years.

To get to that point, Hyster and Yale are explaining how AMRs and semi-autonomous lift trucks can provide real returns on investment (ROI). *Robotics 24/7* asked the companies about their perspectives, and Kyle Smart, sales manager for robotics at Yale Lift Truck Technologies, and Steven LaFevers, vice president of emerging technology at Hyster, gave the replies below:

Yale offers a counterbalanced autonomous stacker. Source: Yale Lift Truck Technologies

Push and pull from the market

Have Yale's existing customers demanded automation, or do you need to educate them about the potential benefits?

Smart: There's a spectrum of demand and readiness on the part of warehouse operations. Some are just dipping their toes in; others have done their homework and have warmed up to the idea that robotic solutions make real business sense and can help improve workflows.

Some businesses may still view robotics as a future proposition, but many of today's warehouses are increasingly tech-enabled. Best-in-class operations expect their material handling equipment to reflect smart automation design and technology integration.

Unexpected events and underlying trends have compelled many operations to accelerate their timeline for warehouse robotics from an opportunity for tomorrow to an essential for today. Specifically, labor costs and challenges

persist, and customer expectations continue to raise the bar for performance.

In recent years, employee turnover is hovering at nearly 50%, and the global workforce shortage is expected to hit 85 million by 2030. As a consequence of replacing such a sizable portion of the workforce, warehouses are exposed to a heavy financial burden even outside of standard wages, with one study pegging the average cost per hire at over $4,400.

Kyle Smart, Yale Lift Truck Technologies. Source: LinkedIn

Robotic solutions take some of the pressure off of warehouses that find themselves consistently short on labor or investing significant resources in training new employees.

Labor and safety are commonly cited as major reasons to move to robotic lift trucks. How are your products designed to improve safety?

Smart: In today's high-turnover warehouse, operations commonly depend on less-experienced employees or workers without substantial experience at a specific site. Distracted or inexperienced lift truck operators may drive too fast, cut corners too sharply, or even drive through prohibited areas, which can lead to mistakes, damage, and injuries.

More than 7,300 forklift-related injuries happen every year. In 2021, the cost per medically consulted injury was $42,000, according to the National Safety Council, and that does not include the cost of property damage.

Compare the variety of risks inherent in a staffing model that relies exclusively on people with one augmented by technology, in which robots follow programmed site-specific rules of the road such as maximum speed or minimum distance from pedestrians.

The consistent, strong performance of navigation technology and site-specific programming enable robots to adapt to surroundings and real-time conditions, while strictly following safety protocols.

This capability helps reduce the risk of accidents, collisions, or other safety incidents, including when compared to lift trucks with human operators. Yale robotic lift trucks are compliant with ANSI/ITSDF B56.5, always default to stop, and sense ground-level obstacles as well as suspended items, such as a ladder on the back of a burden carrier.

How can relieving retention problems increase operational productivity?

Smart: Robotics can help curb employee turnover and maximize workforce productivity by automating repetitive tasks like load transportation and even retrieving or depositing loads from elevated conveyor lines and storage locations.

Augmenting a workforce with automation relieves employees of mundane, repetitive tasks, freeing them to focus on more engaging responsibilities. That shift is meaningful for retaining top talent – according to a Gallup study, organizations with better employee engagement achieve higher performance, including substantially better retention and productivity.

Who can benefit from automated lift trucks

What are some other benefits of automation?

Smart: Investments in automation might seem cost-prohibitive given the upfront spending required, yet robotic lift trucks can actually help cut operating expenses by up to 70%.

In addition to the direct labor savings associated with hourly wages, overtime, and holiday pay, automation can drive savings by drastically reducing costs associated with retraining and re-education, insurance, workers' compensation, and lost time due to illness or injury.

Automation can also help reduce mistakes and increase productivity. Impacts or mistakes may cause expensive damage to inventory, equipment or racking. To replace a damaged lift truck, companies often resort to renting or leasing a truck, which adds unplanned cost.

In anticipation of frequent downtime, companies may even regularly carry more lift trucks than necessary, adding additional units through lease, short-term rentals or outright purchase. Automation is a reliable solution to minimize the risk of costly

downtime and unexpected delays.

Simple, routine tasks are prime opportunities for error, such as misplacing inventory or failing to update the warehouse management system [WMS]. The wrong pallet placement may require staff to stop and search for a missing pallet or delay delivery to a customer.

Robotic lift trucks place loads where they are programmed to be placed, reducing costly time spent hunting for misplaced inventory. And because robotic lift trucks are capable of interfacing with the WMS, they can be tracked in real time through a management portal.

Are there particular segments that could use autonomous pallet movers most?

LaFevers: Robotics are a popular consideration in warehouse settings, but they can also be extremely productive performing applications in the manufacturing sector.

For example, a robotic tow tractor can be used in a variety of time-intensive cart and product hauling duties, such as sequencing of parts, moving parts where they need to be when they need to be there to keep finely-tuned production lines moving. They can also be deployed for trash runs, collecting waste throughout the shop floor.

Steven LaFevers, Hyster. Source: LinkedIn

Likewise, a robotic counterbalanced stacker can be used to automate common pickup and drop-off horizontal transport jobs, like picking up loads from elevated pallet conveyors on stretch wrapper and palletizing lines and then transporting them to outbound staging.

Yale focuses in-house R&D

What were some of the biggest challenges in developing autonomous trucks? Do any still remain?

Smart: At Yale, our focus on research and development and technology integration has an established record of bringing technology to market quickly, including hundreds of robotic lift trucks.

Our robotic lift trucks aren't one-off solutions or aftermarket retrofits. They are built in-house, with the robotics components installed during the manufacturing process, offering a tightly integrated package with greater convenience for customers and product consistency.

Because we provide a mature, commercially proven lineup, our robotic lift trucks benefit from experience in a wide-range of real-world applications and continuous improvement.

The challenge for warehouses is that for technology investments to deliver on their promise, integration is critical ... the truck and technology must work together. Robotic lift trucks have different requirements and tolerances than standard trucks.

For example, robotic lift trucks require indoor work settings with clean, smooth, dry floors and ramps or inclines less than three degrees.

While implementing robotics in your warehouse does not have to require massive infrastructure shifts, optimizing workflows and the facility for automation is an important step, and those recommendations are part of the full solution from our team of experts.

This process can help identify considerations that can help provide a more complete solution, such as automated charging, which enables robotic lift trucks to return to a charging station and dock when needed, without an operator or supervisor initiating the charge.

Deployments grow

How widespread are deployments so far, domestically and globally?

Smart: We have approximately 600 robotic lift trucks in the field today.

LaFevers: Robotic forklifts are increasingly being deployed, and we have many active today in manufacturing facilities. Operations that have multiple shifts, repeatable paths, and long runs are typically the best scenarios for robotic lift truck deployments.

Our infrastructure-free navigation enables additional robotic units to be deployed quickly to where the need is most urgent.

Hyster talks training, supervision, and support

How much training does the end user need?

LaFevers: As with all tools, proper safety training and protocols are essential. All employees should be trained on proper procedures for working in a facility where robots are present.

New technology can only be effective to the extent to which it is accepted, so thoughtfully introducing employees to robotics is an important step and opportunity.

Hyster deploys an autonomous tow tractor in automotive manufacturing. Source: Hyster

Best practices involve proactively informing teams about any changes to the workplace involving robotics, sharing how workflows will change and reinforcing the meaningful benefits of automation — namely, less repetitive work, allowing employees to focus on more engaging value-added responsibilities.

How much supervision or intervention is required? Is there a manual option?

LaFevers: Robotic lift trucks are fully autonomous, though a floor supervisor is needed. A floor supervisor responds if the truck encounters an exception that requires intervention.

Robotic lift trucks locate themselves in real-time by comparing what the navigation laser detects with the reference map, allowing the truck to perceive and interact with its environment in real time, making decisions autonomously. However, to switch a truck from automated mode to manual, an operator simply needs to push a button, step on the truck platform, or take control of the tiller handle.

Who manages support and service of your products? What's the role of integrators?

Smart: Our dealer network is 4,600+ technicians strong, and the same certified Yale dealer who services your manual lift trucks is trained to service your robotic trucks too.

Our network of dealers has front-line experience implementing, supporting and helping customers get the most out of robotics. They are free from the constraints of factory ownership and are instead empowered to focus solely on customer success, matching customers with a solution tailored to their needs and providing the responsive support necessary for real-world results.

ROI and use cases

Is there a typical time to return on investment?

LaFevers: Oftentimes, a customer can achieve a return on their investment in 12 to 18 months in a three-shift application or 18 to 24 months in a two-shift application.

The exact timeline depends on several variables, including the quantity of manual units replaced, quantity of robotic units purchased, total operating hours, and burdened labor rate.

What are some of the latest developments in technology or use cases?

Smart: For warehouses to truly benefit from automation, they need proven solutions, not science fair projects. That's where we can help, with robotic lift trucks that have been tested and approved in a variety of workflows and represent the industry's largest deployed fleet.

Advances in sensors and robotic technology enable Yale robotic lift trucks to automate a number of common tasks. They include clearing receiving docks, putting loads in storage, moving items to areas that support value-added services like kitting and bundling, retrieving inventory, and moving loads to outbound locations.

What plans do you have for automating more product lines?

Smart: At Yale, our design process is driven by our customers and their challenges. As part of our process, we closely consult with customers, understanding the realities of their applications, and we rigorously test and refine based on customer feedback. •

Eugene Demaitre *is editorial director of* Robotics 24/7.

Safety Standards and Mobile Robot Top Modules: The Questions You Should Be Asking

End users and integrators need to be aware of relevant safety regulations and certifications for top modules as well as mobile robots.

BY CARSTEN SORENSEN, ROEQ

ccessories such as the ROEQ TML200 PR250 forks can be certified for safety compliance. Source: ROEQ

The ability for autonomous mobile robots, or AMRs, to work safely alongside people is key to their ongoing success, according to ROEQ. But safety in these applications is about much more than the navigation of the robot itself through your facility.

Mobile robotic equipment (MRE) – including the lifts, carts, and top rollers that interface with conveyors and other surrounding equipment – are critical elements that allow the mobile robot to perform its tasks. And workers who load and unload material may actually have more interaction with those top modules than the AMR itself.

How do safety standards apply to top modules?

Around the world, standards organizations and regional regulatory bodies have developed guidelines and regulations that provide frameworks for the safety of machinery and related products. One example is the European Machinery Directive (MD),

whose requirements manufacturers, importers, and distributors must meet.

The directive also says products must carry the CE mark, which indicates that the machinery complies with EU safety standards. To meet such standards, AMRs include sensors and other built-in safety features that allow the robots to navigate collaboratively around human co-workers by slowing down, changing direction, or stopping to avoid collision.

However, confusion often arises around MRE and safety standards because this equipment is not part of the robot itself, but is a critical element of the robotic application. This is a complex topic that can't be covered in a single blog post.

But we regularly hear questions about MRE safety that illustrate common misconceptions. Let's examine a few of them, including why some questions aren't actually applicable, and what you should be asking instead.

What is the safety level of your top modules?

This common question is well-meaning but misguided, as there are no defined safety levels for AMR top modules.

The question may be referring to performance levels, which standards organizations have established to define the reliability of a safety function designed to mitigate an identified risk, based on the potential exposure to and severity of injury. As top modules aren't considered safety functions, performance levels aren't applicable, but top modules still need safety features.

One common choice is between standardized top modules from an established manufacturer versus do-it-yourself (DIY) top modules built in-house or by a local integrator.

Unlike DIY equipment, standardized top modules, such as those from ROEQ, incorporate safety as a critical element of the R&D process. That includes understanding and complying with all relevant standards.

For instance, ROEQ uses safety programmable logic controllers (PLCs) and safety-rated sensors to meet performance levels for safety functions that we build in to mitigate identified hazards.

E-stop for ROEQ top module. Source: ROEQ

Questions you should ask your MRE manufacturer:

- What safety features and functions are built into the top module you're recommending for my application?
- What is the performance level of the safety function that hinders pallets from being unloaded accidentally?

Are your top modules CE-marked?

While robotics supplies are not required to comply with EU laws or standards when outside the EU, the CE mark provides a strong and proven framework for overall safety, so it is often used along with amendments that address local requirements. The CE mark applies solely to "completed machinery" and not to single elements of it.

Since top modules and related MRE require a robot to function and cannot operate independently, they are not considered to be "completed machinery." That means that top modules themselves cannot be CE-marked.

If your application is installed in the EU, it requires a CE mark, and the process is managed by your integrator or in-house integration team. The CE mark

Integrators work with robots, top modules, and end users. Source: ROEQ

builds on a risk assessment and must contain a technical dossier showing that the installation complies with standards, including all equipment, training manuals, and safety signage.

While top modules alone can't be CE-marked, commercial modules from an established manufacturer can help ease the certification process. For instance, ROEQ provides the required Declaration of Incorporation (DoI) and instruction manual for the integrator to build on when doing the risk assessment. This saves time and ensures consistency for integrators and end users.

Questions you should ask your MRE manufacturer:

- Is this top module built on standards outlined in the Machine Directive?
- Did you perform a risk analysis when designing this top module?

Can you make a DoC on your top module?

The simple answer is no. The Declaration of Conformity (DoC) is a legal document confirming that the machinery meets the requirements of the Machinery Directive.

However, the DoC is based on two items from the equipment manufacturer: The Declaration of Incorporation (DoI) and the instruction manual for the equipment. The DoI states which parts of the Machine Directive are relevant for the top module, along with information about the manufacturer. The instruction manual describes the equipment's safety functions and residual risks.

Proven and tested commercial top modules, such as those from ROEQ, come with everything the integrator needs to create the DoC. This makes it easier for the integrator to do the full risk assessment without having to develop all the material from scratch.

And both integrators and end users have the confidence that these documents have been created according to requirements and with full understanding of the rules and regulations.

ROEQ does risk analyses during development, analyzing what-ifs and building in sensors and safety features to mitigate those risks. This information is described in the instruction manual for the MRE.

Questions you should ask your MRE manufacturer:

- Does your top module come with a Declaration of Incoporation?
- Have you described the safety functions of in this top module?

Every mobile robot user and integrator wants to ensure the safety of workers. Building complete robotic solutions around MRE that does not comply to safety standards can be very challenging, as safety must be built into the product itself.

Incorporating proven, standardized MRE makes meeting safety standards much more efficient and removes the burden of meeting safety standards with DIY top modules. •

Carsten Sørensen *is partner and head of sales and support at ROEQ. This article is republished with permission.*


Declaration of Incorporation
In accordance with the EU Machinery Directive 2006/42/EC Annex II 1.b

Manufacturer:
ROEQ Aps., Glasvænget 9, 5492 Vissenbjerg, Danmark

Example of a DoI. Source: ROEQ